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STUDIES IN ORNAMENTAL TREES AND SHRUBS

BY

HARVEY MONROE HALL

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INTRODUCTION AND ACKNOWLEDGMENTS.

The people of California are slowly coming to a realization of the fact that the climatic and soil conditions of this state are suitable for the growth of the best ornamentals that the world affords, and that they have the opportunity here to develop a high-class system of landscape gardening. This realization is leading to a demand for more information concerning the better sorts of ornamental shrubs and trees. The object of the present paper is to aid in supplying such information and is at the same time a critical botanical study of the species here presented.

Many of our best ornamentals are scarcely known outside of the grounds of a few wealthy citizens who have introduced them for their own pleasure, others are appreciated only by certain communities. Some of these desirable sorts are here given attention in order that their use may become more general. It is especially hoped that small grounds and yards may be planted with only the best, but it is also hoped that those interested in laying out villa sites, public parks, school-grounds, cemeteries, railroad parks, and the like, will be stimulated to more care and discrimination in the selection of trees and shrubs, since their choice affects the pleasure of many people throughout many years.

Aside from their ornamental value, many of the plants mentioned in this paper will doubtless be found useful in the work of reforestation. Several species of Hakea, and especially the more drought-resistant sorts of Pittosporum and Melaleuca, are among the most promising shrubs and small trees for chaparral planting in our foothill districts. Certain of the plants here considered will be of much value in California, when better known, because of their edible fruits or nuts. This particularly applies to *Feijoa Sellowiana,* and to *Macadamia ternifolia,* both trees of high ornamental value.

The greatest confusion exists among California gardeners, nurserymen, and architects, concerning the names of many of our plants. This is due, in part, to the fact that they are not grown in eastern or European gardens; hence they are not described in the standard gardening dictionaries. For most of

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the groups here treated, easy, artificial keys to the species have therefore been prepared, and many illustrations added.

The garden investigations were undertaken as a part of the author's duties as assistant botanist to the Agricultural Experiment Station of the University of California. Financial aid was received from grants from the Adams Fund of the United States Government, but this paper is not to be considered as the sole result of these investigations, or even as the most important result. The critical examination of specimens gathered during the course of this study was undertaken at the University, where free use was made of the botanical library and of the herbarium.

It is a pleasure to acknowledge the assistance received from numerous nurserymen, gardeners, and other residents of California, who have allowed the writer a free examination of their plants and supplied much valuable information. Dr. F. Franceschi and Mr. W. H. Morse, of Santa Barbara, Mr. Compton of Montecito, Mr. Ernest Braunton and Mr. L. A. Greata, of Los Angeles, Mr. D. W. Coolidge, of Pasadena, Miss K. O. Sessions, of San Diego, Mr. John McLaren, Superintendent of Golden Gate Park, San Francisco, and many others should be mentioned in this connection. Among the foreign correspondents who have supplied critical notes, or specimens for comparison, it is a pleasure to mention Dr. J. H. Maiden, Government Botanist for New South Wales, Mr. T. F. Cheeseman, of the Museum at Auckland, the late Mr. H. J. Matthews, formerly Chief Forester of New Zealand, and Mr. Joseph Burtt-Davy, Government Botanist for the Transvaal. Mr. C. N. Forbes, of Honolulu, has supplied valuable material from the Hawaiian Islands.

I am indebted to Mr. Harry Evans for the preparation of line drawings used in figures 1 to 13, and to Miss Carlotta Case for the one used in figure 15. The drawings used in plates 3, 4, and 5 are all the work of Mrs. Louise Nash. Of the text figures, no. 2 is adapted from Curtis' *Botanical Magazine,* plate 2246; no. 5 is from Hooker's *Icones Plantarum,* plate 447; and no. 14 is a tracing from Lindley's *Botanical Register,* plate 410. All of the others are original, drawn either from the living plant or from herbarium specimens. All line drawings used in the preparation of the plates are original, except figure 2 of plate 3.

PITTOSPORUMS CULTIVATED IN CALIFORNIA.

Pittosporum is the generic name of certain ornamental evergreen trees and shrubs which have come to us mostly from New Zealand, Australia, and the neighboring islands. About seventy species are known, of which some fourteen have found their way into California.

The popularity of these plants is due to the ease with which they are grown and to their suitability for planting in various situations. It is a remarkable fact, however, that several of the better sorts are scarcely known to our nurserymen and landscape gardeners. These have been introduced and grown on private grounds where their superior qualities are fully appreciated, but no particular effort has yet been made to extend their cultivation. It is for the double purpose of making these species better known and of providing keys and descriptions whereby any Pittosporum grown in California may be identified, that this account has been prepared.

Special Uses.

It has been said above that Pittosporums are suited to many conditions. The species adapted to special purposes may be grouped as follows:

As a street or avenue tree *P. undulatum* (the Victorian Box) has been much recommended in southern California, especially by Mr. Ernest Braunton, and its rapid growth, large size, and smooth, green leaves are certainly in its favor. It will, however, require careful training and can be expected to attain stately dimensions only where abundant summer heat and some irrigation can be depended upon. A species of much greater promise is *P. rhombifolium,* of which there are now several good examples in California. This has a more erect growth with a single central shaft and pyramidal crown and is gorgeous with orange-scarlet berries for several months in each year. *P. phillyraeoides, P. eugenioides,* and *P. crassifolium* may also be considered in this connection, but are not to be generally recommended.

For hedges *P. undulatum* is the best if a broad, massive hedge is desired. *P. eugenioides* is the best in case a tall, narrow hedge is wanted, particularly if a light-green color is preferred. *P. tenuifolium* also may be trimmed into a narrow hedge, but is more twiggy, less leafy, and of a darker green color. Both of these two last-mentioned take very kindly to pruning, making neat hedges generally superior to the much used privet and box. For low hedges and for edgings the rambling, light-green and glossy *P. heterophyllum,* a recently introduced and still rare species, should be considered.

The most fragrant Pittosporums are *P. Tobira* and *P. undulatum.* These are both sweet-scented, the fragrance resembling that of orange blossoms, while the flowers of *P. eriocarpum* have a very pleasing banana-like fragrance.

For general yard and lawn planting, where only a shrub is desired, any of the species here described may be used, except only the tree-like species and the half-reclining *P. heterophyllum.* Even such arboreous sorts as *P. crassifolium* make good shrubs if well headed in, the pruning serving the double purpose of keeping the plant within bounds and of causing it to throw out an abundance of new foliage. In case a mass of gray-colored foliage is desired, *P. eriocarpum* is by far the best.

For reforestation purposes *P. phillyraeoides* is perhaps to be recommended as of most importance because of its drought-resisting powers. It would grow readily on any of our lower ranges without attention but would need to be protected from browsing animals in its early stages. *P. tenuifolium* and *P. crassifolium* are among the most hardy species and could be used throughout the coast counties of California.

Propagation.

The seeds of Pittosporum usually germinate readily, but in California the rarer sorts are occasionally infertile. This is probably due to the absence of cross-pollination, particularly in those cases where the parent plant is the only one of the species in the neighborhood. It is claimed by some that only the spring crop of seeds of *P. rhombifolium* are fertile. *P. phillyraeoides* is perhaps the most difficult species to propagate in this way, but it throws up numerous root suckers which may be separated from the parent and transplanted.

The most rapid, and for most species the most satisfactory method is propagation by cuttings. These should be taken from the half-ripened wood and seldom fail to strike root if given ordinary care.

It is sometimes desirable to "work over" one species into another after the plant has attained considerable size. While this may possibly be accomplished by the ordinary methods of grafting, at least in some cases, the procedure known to nurserymen as inarching is more likely to prove successful.

Botanical Description of Pittosporum (Family *Pittosporeaceae*).

Shrubs and small trees, mostly evergreen. Leaves simple, without stipules, entire or toothed, mostly alternate but sometimes so crowded as to appear whorled on the twigs. Flowers in terminal corymbs or panicles, or in axillary umbels, or solitary. Sepals 5, either distinct or united at base. Petals 5, rarely distinct to base, usually connivent or cohering in a tube. Stamens 5, free; anthers erect, ovate-oblong. Ovary sessile or short-stipitate, incompletely 2-celled (or rarely 3- to 5-celled). Style short. Fruit a globose, ovate, or obovate capsule, often compressed, sometimes colored and berry-like in appearance, the valves leathery or almost woody, the placentae central. Seeds thick or globular, not winged, smooth but usually embedded in a viscous substance, disagreeable to the taste because of the presence of an aromatic, resinous, or acrid principle. The name "Pittosporum" is derived from two Greek words and may be translated as "pitch seed." This term was chosen because of the pitch-like exudation of the seed-coats just mentioned.

Key to the Species of Pittosporum grown in California.

A. Color of flowers black or nearly so.
Flowers mostly axillary, *i.e.*, each from the axil of a leaf: leaves thin, glabrous .... 1. *P. tenuifolium.*
Flowers in terminal clusters: leaves thick.
  Leaves with recurved margins, white-tomentose beneath: capsule ¾ to 1¼ in. long, tomentose .... 2. *P. crassifolium.*
  Leaves with flat margins.
    Capsule ⅔ in. long, pubescent: leaves white-tomentose beneath .... 3. *P. Ralphii.*
    Capsule ¾ to 1 in. long, glabrous: leaves glabrous when mature .... 4. *P. Fairchildii.*

B. Color of flowers white, greenish, or yellow.
Leaves very obtuse, thick and leathery.
  Flowers ⅜ in. long, in terminal umbels, usually pure white.
    Foliage uniformly green .... 5. *P. Tobira.*
    Foliage variegated with white .... 5. *P. Tobira variegatum.*
  Flowers 2/8 in. long, in terminal panicles, greenish yellow .... 6. *P. viridiflorum.*

Leaves acute, thin.
Flowers in terminal clusters: leaves lanceolate or broader.
Young foliage glabrous or nearly so.
Petals about ½ in. long: flowers rather few (rarely over 20 in each terminal cluster).
Capsule many-seeded: flowers white, fragrant ....7. *P. undulatum.*
Capsule 4-seeded: flowers greenish yellow......8. *P. tetraspermum.*
Petals less than ¼ in. long.
Leaves entire or merely undulate: sepals acute.
Erect, with leaves 2½ to 4 in. long...............9. *P. eugenioides.*
Half-reclining, with leaves 1 in. long....10. *P. heterophyllum.*
Leaves coarsely toothed: sepals obtuse..........11. *P. rhombifolium.*
Young foliage and capsules very pubescent.
Leaves 7 to 10 in. long, abruptly narrowed to a long petiole ....12. *P. hawaiiense.*
Leaves smaller, tapering to the petiole.
Tomentum rusty: leaves 2 to 3 in. long ....13. *P. revolutum.*
Tomentum white: leaves 4 to 6 in. long ....14. *P. eriocarpum.*
Flowers axillary, i.e., each from the axil of a leaf.
Leaves glabrous, flat: flowers yellow ....15. *P. phillyraeoides.*
Leaves tomentose underneath, margins rolled back: flowers purple and yellow ....16. *P. bicolor.*

1. **P. tenuifolium** Gaertn. *P. nigricans* Hort.

A shrub or small tree, rarely exceeding 30 ft., of symmetrical and compact growth: bark black: leaves glabrous and shining when mature, oblong or somewhat obovate, acute or rarely obtuse, 1 to 3 in. long, thin or almost membranous, the margins wavy: flowers solitary in the leaf-axils or rarely fascicled: corolla ¼ to ½ in. long, dark purple: ovary silky: capsule ½ in. long, globose, 3-valved, glabrous and minutely roughened when mature. New Zealand.

One of the best sorts for mass planting and for hedges in California. Its clean, thrifty growth makes it desirable for planting near houses and especially for screening undesirable views. An occasional judicious pruning is necessary in order to get a good foliage effect and to hide the stems.

A yellow-flowered form of this species has just been discovered in Berkeley by Miss Katherine Jones. It is represented by but two shrubs growing in a row of normal black-flowered plants, and no other difference can be detected. It will be further studied and propagated for distribution, since the yellow flowers render it more attractive than the ordinary sort. Mr. T. F. Cheeseman, who has made a careful study of the New Zealand species, writes that although he has not known *P. tenui-*

folium to produce yellow flowers, he has noted this variation in other dark-flowered species. He has, therefore, no hesitancy in referring our yellow-flowered form to *P. tenuifolium.*

2. **P. crassifolium** Soland. Karo.

A tall shrub or small tree, 15 to 30 ft. high, with erect branches: bark dark brown or black: branchlets, petioles, lower surface of leaves, inflorescence, and ovaries all densely clothed with a white or buff downy pubescence: leaves 2 to 3 in. long, narrow-obovate or oblong, obtuse, much narrowed to the short stout petiole, very leathery, dark green and shining above, the margins recurved: flowers in clusters terminating the branchlets: petals ½ in. long including the recurved tips, nearly black: fruiting peduncle stout, recurved: mature capsule subglobose, ¾ to 1¼ in. long, short-hairy, with very thick woody valves. New Zealand. Illustrations: *Bot. Mag.*, pl. 5978 (wrongly colored); Kirk, *Forest Fl. N. Z.*, pl. 14; *Gard. Chron.*, ser. 3, xxx, fig. 130.

Too coarse and rigid for ordinary yard planting unless frequently pruned back, but with care it may be made to assume a rounded, bushy form which is very pleasing. Suitable for windbreaks and shelter near the sea. In New Zealand (where a yellow-flowered form occurs) it is said to resist the fiercest gales and to grow even where washed by salt spray. The wood is white and tough, used for inlaid work, and is difficult of combustion.

3. **P. Ralphii** T. Kirk.

A loosely branched shrub 8 to 15 ft. high: leaves spreading, 2 to 5 in. long, oblong or oblong-obovate, the margins not recurved: petioles and peduncles rather slender: capsule ⅔ in. long, broadly ovoid, pubescent. New Zealand. Illustration: *Gard. Chron.*, xxvi, fig. 72 (probably this).

Rare in cultivation. I have seen one specimen on the Hale grounds, Santa Barbara, imported through the Brisbane Botanic Gardens. It is more thrifty and apparently of better habit than *P. crassifolium. P. Ralphii* differs from that species in that "the leaves are much larger, oblong, not gradually narrowed into the petiole, and the margins are flat, not recurved, while the capsules are much smaller" (Cheeseman). The Santa Barbara plant bears out this statement except that the leaves are narrowed to the petiole.

4. **P. Fairchildii** Cheesem.

A compact round-topped shrub 8 to 15 ft. high; leaves 2 to 3 in. long, obovate to elliptic-oblong, broader than in no. 2, glabrous when mature, the margins flat: capsule ¾ to 1 in. long, becoming glabrous when half-grown: otherwise like *P. crassifolium.* New Zealand.

This species has not yet made its appearance here, but is certain to be introduced from New Zealand, where it is grown in gardens. More graceful and compact than *P. crassifolium* and perhaps better suited to general planting.

5. **P. Tobira** Ait. TOBIRA. JAPANESE PITTOSPORUM.

A large spreading shrub with shining dark-green or variegated foliage: bark gray: leaves 2 to 3½ in. long, 1 to 1½ in. wide, obovate and very obtuse, gradually tapering to the short petiole, thick and leathery, the margins recurved, perfectly glabrous: flowers in terminal umbels, fragrant: corolla ⅜ in. long, white or rarely yellowish: capsule ½ in. long, ovoid, 3- or 4-angled, densely short-hairy, tipped with the persistent style. China and Japan. Var. *variegatum* Hort. has the leaves (often thinner) variegated with white. Illustrations: *Bot. Mag.*, pl. 1396; Nicholson, iii, fig. 193 (pot plant); Bailey, fig. 1837; Engler & Prantl, *Nat. Pfl.*, iii, 2a, fig. 62.

Especially valuable because of its deep-green foliage and abundant fragrant flowers, these latter resembling orange blossoms, both in appearance and odor. Suitable for lawns and shrubberies rather than for hedges. Dr. Franceschi states that it withstands violent saline winds better than most other shrubs and is therefore adapted to seashore planting.

6. **P. viridiflorum** Sims. *P. sinense* Desf. GREEN-FLOWERED PITTOSPORUM.

Much like *P. Tobira* but becoming larger, more tree-like and with smaller greenish and yellow flowers in dense compound clusters: ripe capsule subglobose, ''glabrous, as large as a pea, 2- to 6-seeded.'' South Africa. Illustrations: *Bot. Mag.*, pl. 1684; Nicholson, iii, fig. 194.

Very rare as yet in California gardens but one of the best of the larger Pittosporums. A magnificent specimen in Santa Barbara, remarkable for its graceful habit and lively-green, glossy foliage, is 25 feet high, the trunk 10 inches in diameter. The very fragrant flowers are borne profusely during the winter and spring months but the tree sets no fruits, perhaps owing to the absence of pollen from other trees.

7. **P. undulatum** Vent. VICTORIAN BOX.

Normally a tree, attaining 40 ft. or more, commonly pruned as a shrub in cultivation, with rich deep-green dense foliage: bark gray: leaves 3 to 5 in. long, 1 or 2 in. broad, oblong, abruptly acute, coriaceous and shining, crowded on the branchlets, glabrous, entire, wavy-margined or flat: flowers rarely more than 20 in the compound terminal cluster, fragrant at night: sepals more than ½ as long as corolla, tapering to a slender tip: corolla white, about ½ in. long: capsule barely ½ in. long, nearly globose, smooth, many-seeded. Australia. Illustrations: *Bot. Reg.*, i, 16; Bailey, fig. 1836.

Very suitable for large hedges where a dense foliage effect is desired; stands pruning well, and so can be kept low, but a much greater breadth will be necessary than if *P. eugenioides* is used. Blossoms with us from January to July, the rich jasmine-like odor, particularly noticeable on quiet evenings, making it suitable for planting in small groups or for individual bushes near summer houses, dining porches, and the like. It is also recommended as an avenue tree for southern California where, with plenty of room and careful pruning from beneath, it attains stately dimensions.

8. **P. tetraspermum** Wight & Arn. MADRAS PITTOSPORUM.

A large shrub: leaves 2 to 4 in. long, ovate or lanceolate, very acute, coriaceous, glabrous, the margin obscurely wavy: flowers in a terminal cluster: sepals minute, tapering to a slender tip: corolla yellowish: capsule nearly globose, glabrous, only 4-seeded. India. Illustration: Wight, *Icon.*, iii, pl. 971.

Introduced in 1897 by Dr. Franceschi, but since lost.

9. **P. eugenioides** A. Cunn. TARATA.

A small branching round-headed tree, 20 to 40 ft. high in its native habitat; a tall shrub or slender open tree in cultivation, the rather sparse and glossy foliage of a very light-green color: bark nearly white on the old branches, pale brown on the twigs: leaves 2 to 4 in. long, ¾ to 1¼ in. wide, elliptic-oblong, acute, often conspicuously wavy-margined: flowers numerous in a branched terminal cluster: sepals minute, obtuse: corolla yellowish, under ¼ in. long: capsule rather more than ¼ in. long, ovoid, pointed at each end, 2- to 4-ribbed, glabrous when mature. New Zealand. Illustration: Kirk, *Forest Fl. N. Z.*, pl. 49.

The most extensively cultivated species in California, a favorite because of its hardiness and the yellowish green color of the foliage. Its slender habit and cheerful appearance renders it especially valuable where something is needed to relieve the somber appearance of our ordinary dark-green shrubbery. When grown for hedges the plants should be set not more than three feet apart and the lateral branches clipped back occasionally; in a few years it may be trimmed to a narrow hedge. The fragrance, said to be very noticeable in wild trees, seems to be lost in cultivation. ''The wood is white, tough, elastic, and of considerable strength, but soon perishes when exposed. It is frequently used by the wood-turner'' (Kirk).

10. **P. heterophyllum** Franch.

A low, half-reclining shrub or low hedge plant with light-green foliage: leaves 1 or 2 in. long, ½ to 1 in. broad, lance-shaped or ovate, tapering to both ends but nearly sessile, entire, glabrous: flowers few in simple clusters terminating short branchlets, the peduncles only very rarely divided: corolla light yellow, about ¼ in. long: capsule barely ¼ in. long, globose, minutely pubescent when half-grown, glabrous at maturity. Western China.

Introduced by Dr. Franceschi in 1908, his specimens with small ovate leaves. In China the leaves are extremely variable in size and shape, even on the same branch. Dr. Franceschi recommends it for large rockeries and embankments, and states that it is drought resistant.

11. **P. rhombifolium** A. Cunn. QUEENSLAND PITTOSPORUM.

A tree of pryamidal growth, said to reach 60 to 80 ft. in height: leaves 3 to 4 in. long, 1 or 2 in. wide, rhomboid, being broadest in the middle and tapering to each end, acuminate, coarsely and irregularly toothed, glabrous: flowers numerous in a wide compound terminal cluster: sepals rather obtuse, about one-half as long as the corolla, this ⅛ to ¼ in. long and white: capsule berry-like, ¼ in. long, nearly globose, tipped by the persistent style and rounded to a short-columnar base, passing from green through lemon color to bright orange-yellow, glabrous. Australia. Illustration: Hooker, *Icon.*, pl. 621.

Little known in California but one of the very best sorts. Sometimes grown as a pot plant, in which case it remains small, and serviceable when young as a shrub, since it flowers when only 5 or 6 feet high, but most valuable for avenue planting and as a specimen tree for lawns and yards. Its central shaft gives it an erect habit, the foliage is clean and thrifty, the flowers not very showy and rather faintly odorous, the bright-yellow berries very conspicuous and the most pleasing feature of the tree. The flowers appear in June and July and the berries persist through the autumn and winter. These berries contain but few fertile seeds, although there is a small spring crop in which the percentage of viability is greater. This species is also propagated by cuttings. Specimens may be seen at the Gould place, Montecito; the Sexton place, Goleta; at Soldiers Home near Los Angeles; and at the Fowler place, Pasadena.

12. **P. hawaiiense** Hilleb.

A small tree 12 to 15 ft. high, with few branches: leaves of the largest, being 7 to 10 in. long and 2 to 3 in. wide, acute, thick, slightly hairy beneath when young or even silvery white in one form, entire: flowers in terminal clusters: corolla cream color: ovary tomentose: capsule 1 in. long, probably globose, rough. Hawaii.

Introduced by Dr. Franceschi in 1907. A promising Pittosporum but probably tender and not very well known.

13. **P. revolutum** Ait.

A tall shrub, the young branchlets and petioles and the flower-stalks covered with short rusty hairs: leaves 2 to 3 or 4 in. long, 1 to 1½ in. wide, elliptic, narrowed to each end, entire or slightly wavy-margined, glabrous above when mature, rusty-pubescent underneath, crowded towards the ends of the branchlets: flower-clusters terminal, rarely a few in the axils of upper leaves: sepals with very slender tips: petals ½ in. long or rather more, pale yellow, often united part way to form a cup-shaped corolla, the free tips recurved: ovary very hairy: capsule ½ to ¾ in. long, with numerous red or brown seeds. Australia. Illustration: *Bot. Reg.*, iii, pl. 186.

Grown in England as a greenhouse shrub but flourishes out of doors at Berkeley. Not particularly desirable except in collections.

14. **P. eriocarpum** Royle.

A large bush or widely spreading bushy tree 10 to 20 ft. high, with light-green foliage and light-gray bark: leaves 4 to 6 in. long, 1½ to 2½ in. wide, elliptic or oblong, narrowed to each end, the margins either minutely wavy or flat, tomentose when young, becoming smooth at least above in age: flowers numerous in an oblong terminal raceme, very fragrant, their stems densely white-tomentose: sepals small, acute: petals yellow, somewhat exceeding ½ in., forming a tubular corolla, the tips recurved: ovary very hairy: capsule ⅜ in. long, nearly globose, rough but nearly glabrous. Himalayas. Illustration: *Bot. Mag.*, pl. 7473.

So far as I know there are but two specimens of this species in California, one at the Gillespie place, Montecito, one in Elysian Park, Los Angeles. Both are noble examples and should incite to further planting. Where a mass of light-colored foliage is desired nothing could be more effective and the fragrance of the banana-scented flowers is very pleasing.

15. **P. phillyraeoides** DC. NARROW-LEAVED PITTOSPORUM.

A graceful tree with habit of the weeping willow but evergreen, 20 ft. or more high, the bark smooth and gray on the branches, becoming checked on the trunk: leaves light green, 2 to 3½ in. long, about ¼ in. wide, linear, tapering to the base, acuminate and the slender tips recurved, entire, equally distributed over the slender pendant twigs, glabrous: flowers fragrant, pediceled, solitary in the leaf-axils (several in each axil in some Australian specimens), the tube ¼ in. long and the recurved portion ⅛ in., yellow: sepals minute: capsule about ½ in. long, oval, compressed, the base somewhat heart-shaped, yellow, the surface granular. Australian deserts. Illustrations: Pl. 1; Maiden, *Forest Fl. N. S. W.*, pl. 4.

This remarkable tree was introduced perhaps in the seventies but its value has been appreciated only within the last year or two. Eminently adapted to dry places and should be tried in our desert country, where, however, it cannot be expected to reach the size attained in the coast counties. The foliage is too sparse for a good shade tree but its slender, pendant branches recommend it as a substitute for the weeping willow, where an evergreen is desired. Propagation from seeds is effected with some difficulty in California, but young plants are now offered by several of the nurseries at Santa Barbara and Goleta. The abundant root suckers may be transplanted if one goes to a considerable depth in digging them, for this tree is deep-rooted. In Australia a sort of bread is prepared from the pulverized seeds and the leaves are browsed by live stock.

16. **P. bicolor** Hook.

A small tree, sometimes 40 ft. high in its native habitat, sometimes only a bush, the young twigs hoary or rusty with a close tomentum: leaves 1 or 2 in. long, about ¼ in. wide, linear, acute, entire but the margins rolled back, glabrous above, tomentose beneath: flowers solitary or several in the leaf-axils: petals ½ in. long, spreading or recurved above, yellow and purple: ovary very hairy: capsules rounded, red and berry-like, ''about the size of peas,'' somewhat compressed. Australia.

Rare in cultivation; once grown at Lincoln Park, Oakland. Hardy in southern England.

HAKEAS CULTIVATED IN CALIFORNIA.

The Hakeas are all evergreen shrubs and natives of Australia, where about one hundred species are known. Those so far introduced into California, eleven in number, are here grown exclusively for ornamental purposes, although several of them (particularly *H. suaveolens* and *H. gibbosa*) could be used to advantage as a chaparral covering for many of our lower mountains and foothills. These species are quite hardy, require neither abundant moisture nor cultivation, and, through their rigid, spiny foliage, are well protected from animals.

The ornamental value of Hakea lies chiefly in its foliage. This is exceptionally beautiful in the broad-leaved *H. elliptica,* where the new growth is of a most beautiful bronze color, or in some lights almost golden. It is a very satisfactory subject for lawn or yard planting where something aside from the usual dull green is desired. *H. nitida* with its holly-like, bright-green leaves is also to be considered in this connection, while if a pale green is desired *H. undulata* should be chosen. The last three species treated in this paper are also grown for their foliage but should be used only where a rigid effect is desired or as a hedge impenetrable to animals and pedestrians.

The only species with showy flowers, so far as our forms are concerned, is *H. laurina,* and even here our interest is aroused more by the oddity of the flower than by its beauty. The abundant scarlet balls of flowers emitting the long golden styles are sometimes two and one-half inches in diameter and render this a most striking shrub, so much so that in Italy it has been referred to as "the glory of the gardens of the Riviera." The remaining species have mostly smaller white flowers.

Botanical Description of Hakea (Family *Proteaceae*)..

Australian evergreen shrubs with alternate ex-stipulate leaves of diversified shape, being flat and broad in some species (and then either entire or merely toothed), terete in others (and then either simple and entire or pinnately parted). Pubescence mostly of appressed hairs attached by the middle, or the plant glabrous. Flowers in pairs, the pairs commonly crowded in close racemes or globose clusters which are mostly sessile in the leaf-axils. Corolla irregular, the tube slender, usually recurved under the limb which is mostly globular, the 4 lobes cohering long after the tube has opened. Anthers sessile in the base of the concave perianth-lobes. Ovary stipitate or nearly sessile. Style either long and protruding or short, dilated at the end. Fruit a hard woody capsule, opening in 2 valves. Seeds 2, compressed, winged above, the wings sometimes continued down the sides.

Key to the Species of Hakea grown in California.

A. Leaves mostly ½ in. or more wide (narrower only in *H. saligna*).

Margins of leaves entire and flat.

Leaves pinnately veined, or the veins obscure: flowers white.

Foliage pale: leaves entire, obtuse, callous-tipped: corolla recurved .... 1. *H. saligna.*

Foliage bright green: leaves sometimes toothed, sharp-pointed: corolla straight .... 2. *H. nitida.*

Leaves parallel-veined: flowers crimson.

Veins 3 to 7: flower-clusters globular: capsule ¾ in. or more broad .... 3. *H. laurina.*

Veins numerous: flower-clusters oblong: capsule ½ in. broad .... 4. *H. multilineata.*

Margins of leaves wavy (undulate).

Leaves veinless or obscurely feather-veined .... 2. *H. nitida.*

Leaves several-nerved from the base and with numerous cross-veinlets.

Margins merely wavy; petiole short or none .... 5. *H. elliptica.*

Margins wavy and prickle-toothed .... 6. *H. undulata.*

B. Leaves terete or very narrowly linear, seldom ⅛ in. wide, sharp-pointed.

Veins several, parallel: leaves flat, about ⅛ in. wide .... 7. *H. ulicina.*

Veins wanting: leaves terete.

Leaves thick, mostly pinnately parted and the lobes terete .... 8. *H. suaveolens.*

Leaves slender, entire.

Corolla glabrous:[1] capsule ovate, ½ in. or more thick.

Young branches glabrous: capsule ½ to ¾ in. thick .... 9. *H. acicularis.*

Young branches hairy: capsule ¾ to 1 in. thick.... 10. *H. gibbosa.*

Corolla pubescent: capsule lanceolate, slenderly pointed, ¼ in. thick .... 11. *H. pugioniformis.*

1. **H. saligna** Knight.

A pale or grayish bushy shrub (attaining 7 ft. at Santa Barbara), glabrous or the young shoots slightly silky: leaves oblong or lance-shaped, 3 to 4 or 6 in. long, obtuse but usually with a minute callous tip, tapering at base to a short petiole, veins sometimes obscure but usually at least a medial and several oblique lateral veins more or less prominent: flower-clusters small, dense, sessile in the axils of the upper leaves: corolla glabrous, strongly recurved: capsule about 1 in. long, ½ to ¾ in. broad, with a short incurved beak, somewhat rough, sometimes covered with conspicuous tubercles. Illustration: Fig. 1.

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[1] In using this character, care must be exercised in distinguishing between the corolla proper and the pedicel, which is also white. The pedicel is pubescent in numbers 9, 10, and 11, but the corolla is pubescent only in the last.

This makes a good foliage plant but has no special character for which it can be recommended; seldom planted.

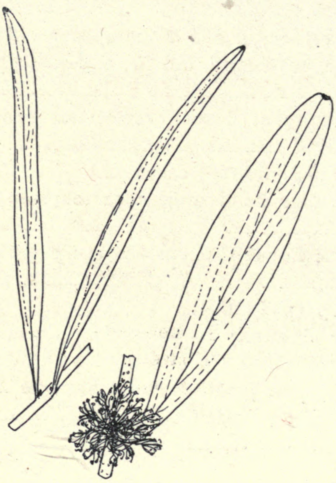

Fig. 1.—*Hakea saligna.*

2. **H. nitida** R. Br.

A large shrub with glabrous and bright-green dense foliage: leaves oblong or narrowly obovate, 1½ to 3 or 4 in. long; either entire, obtuse, and with a small sharp tip, or with a few prickly teeth, acute, and sharp-pointed; thick and veinless or obscurely feather-veined: flower-clusters white, conspicuously stalked in the leaf-axils: corolla glabrous, straight: capsule 1 in. or more long, ¾ in. broad, with a conical horn near the end of one or both of the valves, smooth. Illustrations: Fig. 2; *Bot. Mag.*, pl. 2246.

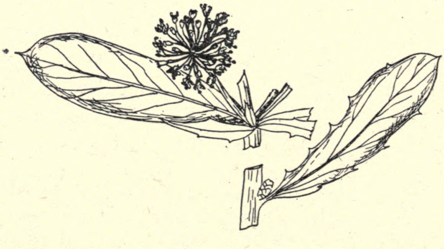

Fig. 2.—*Hakea nitida.*

One of the earliest species introduced into England (where protection from frost is necessary). Presumably also grown in California, although no plants can now be located. The pleasing green foliage, suggestive of holly-leaves, may render it desirable.

3. **H. laurina** R. Br. *H. eucalyptoides* Meissn.

A tall shrub, attaining in Australia to 30 ft. and tree-like: branchlets gray with a minute pubescence or reddish and quite glabrous; foliage rusty pubescent when young but soon glabrous: leaves elliptic or lanceolate, narrowed to the apex which is either acute or obtuse, tapering to the petiole, often sickle-shaped, 5 or 6 in. long, ½ to 1 in. wide; with mostly 5 or 7 parallel veins from the base and these sometimes giving off a few obscure secondary veinlets: flowers crimson, very numerous, in dense globular clusters sessile in the leaf-axils: capsule ovoid, short-beaked, about 1¼ in. long by ¾ in. broad, nearly smooth. Illustrations: Fig. 3; *Bot. Mag.*, pl. 7127.

A very vigorous and striking sort with showy crimson flower-clusters from which protrude the long golden-yellow styles. Perhaps the best for dry hillsides where a chaparral covering is desired. Known on the Riviera as "Sea Urchin."

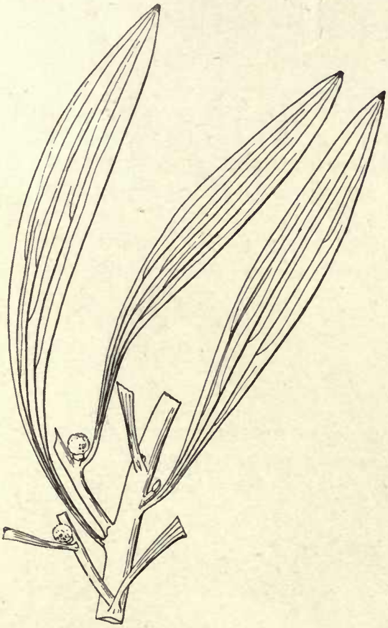

Fig. 3.—*Hakea laurina.*

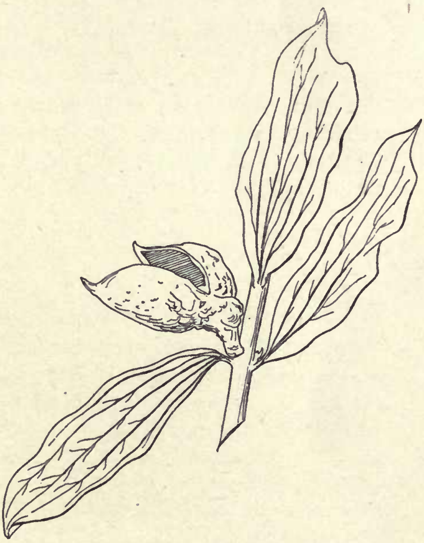

Fig. 4.—*Hakea elliptica.*

4. **H. multilineata** Meissn.

A shrub or small tree resembling *H. laurina*: leaves narrow and 6 to 8 in. long, or broader and only 3 to 5 in. long, striate with numerous parallel nerves: flower-clusters oblong, 1 to 3 in. long, sessile in the leaf-axils, carmine in the center, fading to pale pink at the tips of the styles: capsule ovoid-globular with a very short beak, about ½ in. broad. Illustration: *Gard. Chron.*, ser. 3, xix, fig. 14 (var.).

This has been reported from California gardens but all of the specimens seen were found to be *H. laurina*.

5. **H. elliptica** R. Br.

A neat erect shrub 6 to 10 ft. high: old herbage pale and glabrous but young twigs and leaves bronzed with a rich rusty pubescence: leaves oval or elliptic, obtuse or with a small callous point, nearly or quite sessile, 2 to 3½ in. long, 1 to 1¼ in. wide, wavy-margined; the 5 to 7 parallel veins conspicuous on both sides and connected by numerous veinlets (reticulate): flower-clusters globose, sessile in the leaf-axils: capsule ovoid, with a stout oblique beak, 1 to 1¼ in. long, ¾ in. broad, usually smooth. Illustration: Fig. 4.

This is the best sort so far tried for general lawn and shrubbery planting, because of its sturdy growth, compact habit, and especially on account of the beauty of its young foliage. The rich bronze color of the young shoots is equalled, so far as I know, only in certain rare species of Roupala (see p. 44).

6. **H. undulata** R. Br.

An erect shrub 6 to 8 ft. high: young shoots rusty-tomentose, the adult foliage glabrous: leaves obovate, oblong, or rarely lanceolate, obtuse, tapering to a conspicuous petiole, 2 to 4 in. long, the margins wavy and sharply toothed; parallel nerves 3 or 5, connected by many cross veinlets: flowers in sessile clusters: capsule recurved at the base, distinctly beaked, 1 to 1¼ in. long, ½ to ¾ in. broad, rather rough. Illustrations: Fig. 5; Hooker, *Icon.*, pl. 447.

Reported from California but I know of no specimens growing in the state.

7. **H. ulicina** R. Br.

A tall shrub with erect branches and dense foliage not unlike that of the Furze, or Gorse: twigs reddish, usually pubescent when young: leaves (glabrous at maturity) all narrowly linear, flat, acute and sharp-pointed, entire, varying in length from 1 to 8 in., very rarely over ⅛ in. wide, prominently 1- to 3-nerved underneath: flowers very small, the pedicels and corolla glabrous: capsule rarely over ½ in. long, with a short straight beak. Illustration: Fig. 6.

Perhaps not yet grown in California.

8. **H. suaveolens** R. Br. *H. pectinata* Colla.

A dense rounded shrub becoming 8 to 10 ft. high in California: young shoots and foliage silky pubescent but glabrous at maturity: leaves 2 to 4 in. long, about 1/16 in. thick, cylindric, with a rigid spine-like tip, narrowly grooved on the upper side, occasionally entire but usually branched into 1 to 5 rigid cylindric lobes of various lengths: pedicels and perianth glabrous: flowers white, fragrant: capsule ovoid, about 1 in. long and ¾ in. broad, narrowed at apex and with a small conical horn near the end of one or both the valves. Illustration: Fig. 7.

This is perhaps the most common of all the cultivated Hakeas. It is easily grown, endures drought, and, by means of its spiny foliage, resists the depredations of animals and vandals. For public parks, depot grounds, and the like, no shrub could be selected which would be better able to care for itself, and it is eminently adapted to planting where an impenetrable hedge is desired. In the vicinity of Santa Barbara, it grows without care or irrigation on the dry hillsides and would undoubtedly make an excellent chaparral covering for many of our mountain slopes.

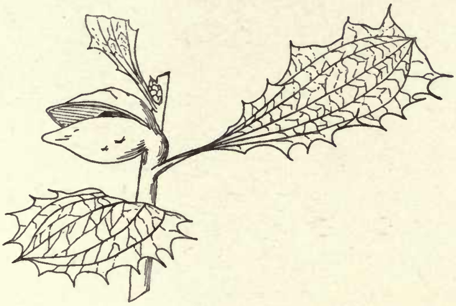

Fig. 5.—*Hakea undulata.*

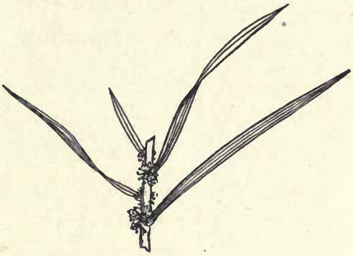

Fig. 6.—*Hakea ulicina.*

9. **H. acicularis** R. Br.

A tall shrub or (in Australia) a small bushy tree: twigs and young leaves sometimes minutely pubescent, glabrous when mature: leaves very slenderly cylindric, rigid, awl-like at the sharp tip, entire and simple, not grooved, mostly about 2 in. long (1 to 3 in.): pedicels silky-pubescent: corolla glabrous: capsule ovoid, about 1 in. long and ½ in. or rather more broad, rough, contracted to a thick beak, each valve with a conic brown horn near the apex.

Suitable for hedges and for shrubberies. More slender than *H. suaveolens.*

10. **H. gibbosa** Cav.

A broad shrub, becoming 6 to 8 ft. high: twigs and young leaves hirsute with short spreading hairs: leaves cylindric, rigid, smooth, simple and entire, sharply pointed, 1 to 3 in. long: pedicels densely pubescent: corolla glabrous: capsule ovoid, oblique, about 1½ in. long, nearly 1 in. broad, rough, abruptly contracted to a short oblique beak, each valve with a small dorsal horn near the apex. Illustrations: Fig. 8; Cav., *Icon.*, pl. 534; *Bot. Cook's First Voy.*, pl. 266.

Grown on the University grounds at Berkeley, a specimen determined by Dr. J. H. Maiden. Probably also elsewhere in the state but under erroneous names. More slender than *H. suaveolens* and better suited to small private grounds; almost equally as resistant to abuse, and should be tried with that species in reforestation experiments.

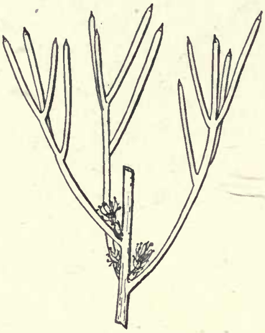

Fig. 7.—*Hakea suaveolens.*

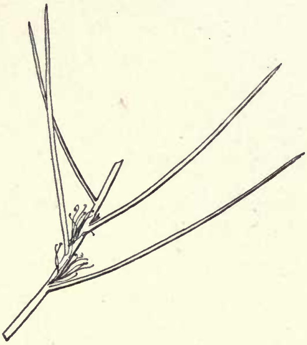

Fig. 8.—*Hakea gibbosa.*

11. **H. pugioniformis** Cav.

A shrub with the habit, foliage, and general characters of *H. gibbosa*, from which it differs as follows: Corolla pubescent: style long, the disk nearly straight: capsule much more slender, lanceolate, acuminate, about 1 in. long and ¼ in. broad, rough around the middle with an obliquely transverse prominent crest, each valve tapering to a slender point. Illustrations: Cav., *Icon.*, pl. 533; *Bot. Cook's First Voy.*, pl. 265.

Grown at Santa Barbara, according to Dr. Franceschi, who says that it is an odd plant, which at a distance looks like a small pine. Some plants found under this name in the trade belong to *H. suaveolens*, a species easily distinguished by the mostly branched leaves and much thicker capsules.

THE BOTTLE-BRUSH GROUP OF ORNAMENTALS.

Bottle-brushes are eminently adapted to shrubbery and ornamental planting in California. They are rapid growers, hardy, endure considerable drought and abuse, and many of them are among the most showy of our cultivated shrubs.

It has been found, however, that the best sorts are not the ones most generally grown and that selection must be made with regard to the surrounding vegetation and to the particular needs. It is also to be remembered that what at first appears to be an undesirable form may become one of the best if given proper treatment, especially as regards pruning. It is hoped that the following notes will be of some assistance in these matters, but the chief aim has been to give an account whereby the different species may be determined. There is perhaps no group of ornamentals, generally planted in California, in which there is a greater confusion as to names, and the current horticultural publications are of but little assistance.

The most elaborate account of this group is to be found in Bentham's *Flora Australiensis,* and this work has formed the basis for my own determinations, aided by more recent scattered papers, a comparison of herbarium specimens from Australia, and certain critical notes very kindly supplied by Dr. J. H. Maiden, the Government Botanist of New South Wales.

The members of the Bottle-brush group are mostly Australian trees and shrubs belonging to the Myrtle Family (Myrtaceae), which may be characterized as follows:

Botanical Description of the Myrtaceae.

Leaves simple, entire, containing oil or resins which are mostly fragrant and commonly give a dotted appearance to the leaf: calyx-tube adnate to the ovary, 4- or 5-toothed, or the teeth wanting: petals as many as the calyx-teeth, sometimes wanting, sometimes united into a cap and falling away together: stamens numerous, attached to a disk lining the calyx-tube and above the ovary: style simple, with a small round or flat stigma: ovary inferior, mostly 2- to several-celled, maturing into a capsule which is adnate to the calyx-tube (as a matter of convenience the term *capsule* is here used as including both the capsule proper and the enclosing persistent calyx-tube, the whole constituting the botanical ''fruit''): ovules commonly numerous but the fertile seeds often few.

In addition to the Bottle-brush group there are a number of related genera, all members of the Myrtle Family, more or less common in cultivation. Such are the Eucalypti, of which something like 100 species are now grown in California. There is also a genus, Angophora, distinguished from Eucalyptus by the five small calyx-teeth and colored petals. *Angophora lanceolata* and *A. intermedia,* both with ribbed, turbinate capsules, are grown here. The former is a tree with smooth, deciduous bark, the latter is a tree with rough, persistent bark. *Syncarpia laurifolia* is sometimes mistaken for Eucalyptus but has distinct petals and the fruits are fused into a small head.

Tristania conferta is a related tree resembling our native Madroñe in general habit. It has conspicuous flowers with five petals each and the stamens united into bundles. The Australian Brush Cherry (*Eugenia*), with fleshy, edible fruits, is also a member of the Myrtaceae. Kunzea is a genus of slender heath-like shrubs with small leaves, belonging to this family but seldom seen in cultivation.

Six other genera, all natives of Australia and surrounding regions, are of especial interest in California gardens and parks. These constitute what may be considered the Bottle-brush group and may be distinguished by the following key:

Key to the Genera.

Anthers attached by the middle (leaves various: stamens either united or distinct).
  Flowers in spikes or heads or solitary in the leaf-axils.
    Stamens much longer than the petals: flowers in dense clusters.
      Filaments not united or only slightly united at the very base .... *Callistemon* (p. 22).
      Filaments united into 5 clusters .... *Melaleuca* (p. 27).
    Stamens shorter than the petals.
      Leaves not 1 in. long: flowers not in close heads, white .... *Leptospermum* (p. 35).
      Leaves 2 to 6 in. long: flowers in small close heads, white .... *Agonis* (p. 36).
  Flowers in loose terminal cymes .... *Metrosideros* (p. 36).
Anthers attached by the base: leaves terete, punctate: stamens red, united .... *Calothamnus* (p. 37).

CALLISTEMON.

The name *Bottle-brush* is particularly applicable to this genus of shrubs, the flowers being arranged in dense cylindrical spikes in which the protruding stamens correspond to the bristles of a brush the handle of which is represented by the woody stem. ''Chimney-sweep'' is another suggestive appellation sometimes used.

Callistemons are favorites in California gardens and deserve to be even better known. They are perfectly hardy with us, endure considerable drought, and take kindly to pruning. In fact, severe autumn pruning is essential if masses of winter and spring bloom are desired. By this means the shrubs may be kept down to almost any desired size, while with but little pruning they may be allowed to occupy large corners or used as border shrubs for wide driveways. They are especially recommended for parks, depot-grounds, schoolyards, cemeteries, and for large private grounds; also for smaller yards, if used in moderation and kept well pruned. *C. brachyandrus* differs from the other species in being suitable for small grounds and is one of the very good shrubs that is little known. It is especially serviceable in adding grace and airiness to an otherwise somber yard.

The propagation of Bottle-brushes is not difficult. Seed is formed in abundance and although only a small percentage may be fertile there is seldom difficulty in getting a good stand. But seedlings are slow in reaching the flowering stage and because of this cuttings are commonly used. These should be taken in spring from ripened wood or at least from wood which is getting firm at the base. Three or four inches is about the proper length and propagation is best affected in sand under glass.

The identification of our garden forms is no easy task, since there are several apparent hybrids to be taken into account, as well as numerous cultivated forms. It is also to be remembered that among nurserymen this genus is occasionally united with Metrosideros, a union which the botanist cannot countenance. Since, however, the species names under Metrosideros are but seldom correctly applied, it would be as well for all interested to familiarize themselves with the proper names under Callistemon.

Key to the Species of Callistemon grown in California.

A. Stamens ¾ to 1 in. long.
Leaves lanceolate or oblong (mostly ¼ in. or more wide).
  Spikes rather loose: leaves with prominent midrib and lateral nerves .... 1. *C. lanceolatus.*
  Spikes very dense, more highly colored: leaves thicker and lateral nerves obscure .... 2. *C. speciosus.*
Leaves linear (less than ¼ in. wide).
  Leaves flat, with prominent midrib, feather-veined...... 3. *C. rigidus.*
  Leaves channeled above, midrib and lateral veins obscure .... 4. *C. linearis.*

B. Stamens ½ in. or less long.
Leaves flat: stamens pale .... 5. *C. salignus.*
Leaves cylindric: stamens bright red, with yellow anthers .... 6. *C. brachyandrus.*

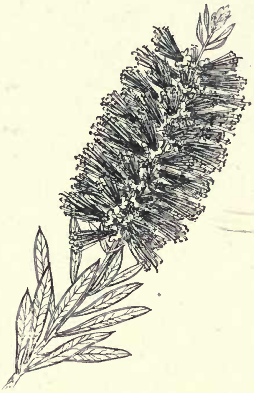

Fig. 9.—*Callistemon lanceolatus.*

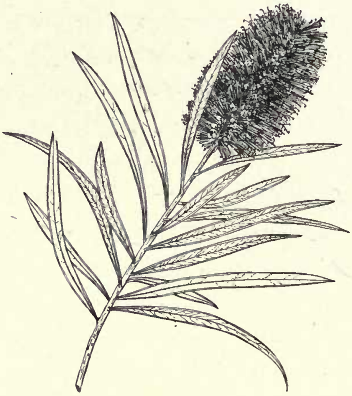

Fig. 10.—*Callistemon speciosus.*

1. **C. lanceolatus** DC. *Metrosideros semperflorens* Lodd.

A tall shrub with erect or spreading but seldom curved branches: leaves lanceolate, 1¼ to 2½ in. long, about ¼ in. wide, sharp-pointed, midvein and lateral nerves prominent: flower-clusters 2 to 4 in. long, not so dense as in the next species, bright red (rarely smaller and pale): stamens mostly 1 in. long: capsule ovoid, contracted at the summit. Illustrations: Fig. 9; *Bot. Mag.*, pl. 260; Cav. *Icon.*, pl. 332; Bailey, fig. 320; *Bot. Cook's First Voy.*, pl. 108; Maiden, *Fl. Pl. and Ferns of N. S. W.*, pl. 8.

This Bottle-brush is one of the most showy and has entered into several of the garden hybrids. Although not so stiff and rangy as *C. rigidus,* it requires severe pruning if a compact, densely flowered shrub is desired. Seldom becomes more than

8 feet high in California but reaches 30 feet and a trunk diameter of 18 inches in Australia, where the hard and heavy wood is used for wheelwrights' work and many implements, such as mallets.

2. **C. speciosus** DC.

A large shrub or becoming a fair-sized tree: leaves narrowly lanceolate, either obtuse or acute, 1½ to 4 in. long, about ¼ in. broad, with prominent midrib as in *C. lanceolatus* but the leaf thicker and the lateral veins obscure: flowers highly colored, bright red, in very dense clusters (sometimes 6 in. long in Australia, much shorter with us): stamens 1 in. long: capsule nearly globose, the summit truncate and but little contracted. Illustrations: Fig. 10; pl. 2; *Bot. Mag.*, pl. 1761; Nicholson, vol. 1, fig. 327.

This is the most highly colored of all the Callistemons, the yellow or golden anthers contrasting finely with the dark-red filaments. With but little training it forms a graceful shrub with many drooping branchlets, eventually becoming a tree under favorable conditions. One specimen in Santa Barbara, now about 20 years old, is 35 or 40 feet high, and receives no care or irrigation. It has two blooming periods, the best being in December and January, but the second (May-June) again covers the tree with gorgeous balls of color suspended on slender pendant twigs. Numerous named cultural forms are derivatives of *C. speciosus*, the differences lying in varying shades of color, habit, and size.

3. **C. rigidus** R. Br. *C. linearifolius* DC.

A stiffly branched shrub, the branches inclined to be longitudinal or spreading: leaves narrowly linear, rigid, sharp-pointed, 2 to 5 in. long, about ⅛ in. wide, midrib and marginal ribs prominent, cross-nerves spreading nearly at right angles or hidden by numerous oil-dots: flower-clusters deep red, large (rarely small and pale): stamens 1 in. or more long. Illustrations: Fig. 11; *Bot. Reg.*, pl. 393; *Bot. Cook's First Voy.*, pl. 109.

Perhaps the most common form in California. Begins to bloom when only a foot or two high, and if left to itself becomes an ungainly sprawling shrub. Should be frequently pruned up when young and headed in when older. In this way a round-topped, compact, densely flowered shrub 6 to 10 feet high may be obtained.

4. **C. linearis** DC.

Scarcely more than a variety of *C. rigidus,* being the extreme form with very narrow leaves which are channeled above, and the midvein quite obscure; fruiting calyx more globular and more contracted at the opening.

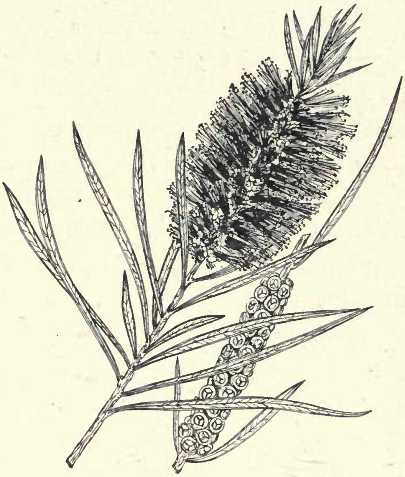

Fig. 11.—*Callistemon rigidus.*

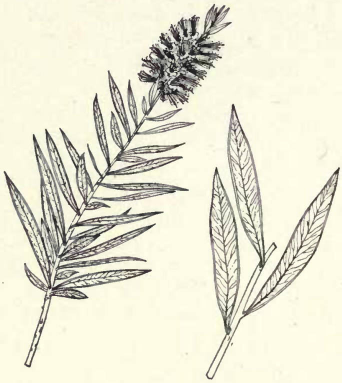

Fig. 12.—*Callistemon salignus.*

5. **C. salignus** DC.

A tall shrub or small tree (6 to 10 ft. high, in Australia reaching 40 or 50 ft.): leaves broadly to narrowly lanceolate, very acute, 1½ to 3 in. long, mostly ¼ to ¾ in. wide, but much narrower in one variety, very distinctly feather-veined: flower-clusters pale yellow or light pink, 1 to 2 in. long, ¾ to 1 in. wide: stamens ¼ to ½ in. long: capsule nearly globular, with rather large opening. Illustration: *Bot. Mag.,* pl. 1821. Var. *viridiflorus* F. Muell. has leaves only 1 to 2 in. long, thicker, the veins obscure, rigid and sharp-pointed: flowers larger, greenish yellow: habit more erect, rigid, and tree-like. Illustrations: Fig. 12; *Bot. Mag.,* pl. 2602.

Rare in California gardens and not especially desirable. The wood, which is very hard and close-grained, is said to be very durable underground and to dress admirably. It varies from a uniform drab color to dark red.

6. **C. brachyandrus** Lindl.

A slenderly branched shrub, the young shoots softly hairy, the hairs sometimes persistent and giving the whole shrub a soft gray tone: leaves rigid, terete, or slightly flattened or channeled, sharp-pointed, ¾ to 1½ in. long: flower-cluster 2 or 3 in. long, 1¼ in. wide: stamens about ¼ in. long, the deep-red filaments nearly obscured by the golden-yellow anthers. Illustration: Fig. 13.

Rare with us but very desirable, the combination of the slender twigs, gray foliage, and golden bloom, being a novelty among Bottle-brushes. Requires frequent heading in for best results.

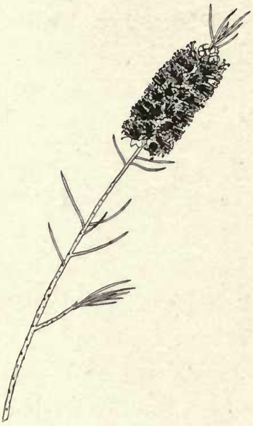

Fig. 13.
Callistemon brachyandrus.

MELALEUCA.

This genus of about 100 species includes a majority of the so-called tea-trees of Australia and many of the shrubs known in California as Bottle-brushes. The flowers are often arranged as in Callistemon, which may be considered the true bottle-brush genus, but the clusters are not so large and showy, except in one species, *Melaleuca hypercifolia.* But if Melaleuca lags behind Callistemon in the matter of brilliant coloring, the various species exhibit more grace and symmetry of outline, and the available species are now so numerous that one or more sorts may be selected for almost any situation.

All of the species here considered are suitable for nearly any locality in California, being hardy, except in the mountainous districts, and capable of withstanding at least moderate drought. It must be remembered, however, that the arboreous species will seldom develop into more than fair-sized shrubs unless given attention and occasional irrigation, and that a combination of warm summers and a moist soil are essential to the luxuriant development sometimes described. So far as I know, no Melaleuca has yet been killed by frost in California.

For ordinary yard planting the best kinds are *M. lateritia* and *M. armillaris,* the former with brick-red flowers, the latter slender twigs and very narrow leaves. *M. hypericifolia* is more spreading than either of these, has recurved branches, brilliant red flowers in large clusters, broad leaves, and never attains a great height. For formal planting *M. linariifolia* will be found more suitable, the branches being more nearly erect, more rigid, and with straight firm leaves of a light-green color. *M. styphelioides* and *M. Huegelii* are also formal in their effect and are of a darker green.

Of the arboreous species, *M. leucadendron* is in the lead and is perhaps the only one to be considered for avenue planting. *M. armillaris* grows sufficiently high, at least in the south and when left unpruned, to make a shade for arbors and walks. *M. nesophila* and *M. ericifolia* are also tree-like, the former being especially good where a mass of ordinary foliage is desired.

As a chaparral covering for our foothills, *M. nesophila, M. decussata,* and *M. styphelioides* are recommended.

Members of this genus are more resistant to alkali than are most plants. In Australia *M. ericifolia* and other species are used for fixing muddy shores where the water is strongly saline and *M. leucadendron* is planted in salt swamps where no Eucalypt will live, being protected by its thick, corky bark. The thick-barked *M. nesophila* and *M. styphelioides* could also be used in these situations, the former being the most promising because of its great hardiness and rapidity of growth. Seedlings should never be transplanted to saline soil until they have developed a good root system and are protected by well-formed bark.

The methods of propagation are the same as given for Callistemons.

Key to the Species of Melaleuca grown in California.

A. Inflorescence a cylindric spike.

Flowers red or scarlet: stamens ¾ in. or more long (except in no. 4).
  Leaves opposite: stamen-claw very long.
    Midrib prominent; leaves ⅙ to ½ in. wide ....1. *M. hypericifolia.*
    Midrib obscure; leaves linear ....2. *M. fulgens.*
  Leaves alternate, narrow.
    Stamens about ¾ in. long, the claws very short: leaves obscurely 1-nerved or nerveless ....3. *M. lateritia.*
    Stamens about ¼ in. long: upper leaves striate with 7 or more nerves ....4. *M. genistifolia.*

Flowers white, blue, lilac, or pink: stamens under ½ in.
Leaves mostly opposite.
Calyx ovoid (the base somewhat narrowed): leaves linear, 1 in. or more long .... 5. *M. linariifolia.*
Calyx with broad base partly embedded in the stems at maturity: leaves linear, ¼ to ½ in. long .... 6. *M. decussata.*
Leaves mostly alternate or spiral.
Length of leaves mostly exceeding ½ in.
Nerves several and the leaves somewhat striate.
Leaves elliptic to oblong, 2 to 4 in. long .... 7. *M. leucadendron.*
Leaves ovate or lanceolate, sharp-pointed, less than 1 in. long .... 8. *M. styphelioides.*
Nerves solitary or obscure, the leaves very narrow and slender .... 9. *M. armillaris.*
Length of leaves mostly ½ in. or less.
Calyx narrowed at base (ovoid): leaves linear, rigid, straight, about ½ in. long .... 10. *M. parviflora.*
Calyx with broad flat base, partly embedded in stem at maturity.
Leaves ovate with broad base, rigid, scale-like, ¼ in. or less long .... 11. *M. Huegelii.*
Leaves linear, slender, curved .... 12. *M. ericifolia.*

B. Inflorescence a terminal globular head, the axis not growing out until after flowering (except in no. 16).
Stems and leaves glabrous or nearly so.
Flowers pink.
Leaves ¼ in. or more wide: capsules in a globose head .... 13. *M. nesophila.*
Leaves ⅛ in. or less wide: capsules in a cylindric spike or scattered .... 6. *M. decussata.*
Flowers white or yellowish.
Leaves rigid, straight, sharp-pointed .... 14. *M. nodosa.*
Leaves lax, curved, scarcely acute .... 12. *M. ericifolia.*
Stems or leaves white with a close tomentum.
Leaves about ¼ in. long .... 15. *M. incana.*
Leaves minute (less than 1/16 in.), scale-like .... 16. *M. micromeria.*

1. **M. hypericifolia** Sm.

A tall glabrous shrub: leaves opposite, lanceolate elliptic or narrowly oblong, acute or obtuse, ¾ to 1¾ in. long, ⅙ to over ½ in. wide, the midrib and numerous dots prominent beneath: flowering spikes of a rich red, 2 in. long and of the same diameter, forming the bases of leafy branches: stamens ¾ to 1 in. long, the claw about ½ in. long and splitting into about 20 filaments: capsule sessile by a broad base: seeds numerous. Illustration: Pl. 3, fig. 1.

One of the most showy species and very popular both for its gorgeous bloom and for the pleasing foliage. Easily mistaken for a Hypericum when not in flower.

2. **M. fulgens** R. Br.

A tall shrub, glabrous throughout: epidermis of the bark peeling off in strips: leaves mostly opposite, from very narrowly linear to narrowly lanceolate, acute or obtuse, ½ to 1 in. long, the midrib very obscure, usually dark-dotted: flowering spikes of a rich dark red, rather loose and few-flowered: stamens often 1 in. or more long, the ribbon-like claw splitting into numerous filaments: capsule cup-shaped, sessile. Illustrations: Pl. 3, fig. 4; *Bot. Reg.*, pl. 103.

Perhaps not grown in California but long known in European gardens and certain to be introduced here.

3. **M. lateritia** Otto.

A graceful shrub with numerous slender branches, 6 to 10 ft. high: bark soft and corky, becoming fibrous: leaves alternate, overlapping, narrowly linear, acute, ½ to ¾ in. long, 1/16 in. wide, apparently nerveless: flowering spikes of a rich scarlet color, cylindric, about 2½ in. long and 1½ to 1¾ in. in diameter, forming the base of leafy branches: stamens ¾ in. long, very shortly united into clusters of 7 to 11 each: capsule with broad base somewhat embedded in the stem. Illustration: Pl. 3, fig. 2.

This is one of the most graceful of all the Melaleucas and with a much more pleasing color than any of the other red-flowered species, the shade being softer and not so harsh. Little known. Good examples may be seen at Elysian Park, Los Angeles, and at Soldiers Home.

4. **M. genistifolia** Sm.

A tall shrub (attaining 40 ft. in Australia), either glabrous or somewhat pubescent: leaves alternate, lanceolate or linear-lanceolate, rigid, acute, usually about ½ in. long, finely striate (at least the upper ones) with 7 or more nerves: flowering spikes loose, often leafy, and the axis usually growing out before the flowers expand: stamens about ¼ in. long, each claw with numerous filaments: capsule nearly globular, crowned by the persistent teeth.

Reported from California but not seen by me. In Australia a tea is made from the leaves.

5. **M. linariifolia** Sm.

A tall shrub (a large tree in Australia), the young parts a little pubescent, adult foliage glabrous and pale green: bark soft, shedding in large flakes: leaves opposite, rigid, linear, tapering to a sharp point, mostly 1 to 1¼ in. long, ⅛ in. wide, the midrib prominent beneath:

flowers white (or lilac?), in pairs (this especially distinct in bud), in dense spikes of 1 to 1½ in. in length, these at first terminal but the axis finally grows out into a leafy branch: stamens ½ to ¾ in. long, the long claws emitting short filaments along their entire length: capsule ovoid-globular, narrowed at base. Illustrations: Pl. 3, fig. 3; Cav., *Icon.*, pl. 336 (poor).

Flourishes at Berkeley and at Los Angeles. A rare sort which should be widely cultivated for its trim habit, pale foliage, and usually pure-white flowers.

6. **M. decussata** R. Br.

A large spreading shrub, sometimes 20 ft. high, the branches commonly pendulous: bark shreddy: herbage bright green and glabrous throughout: leaves strictly opposite, elliptic oblong or lanceolate, acute or obtuse, narrowed to the base, ¼ to ½ in. long, nearly ⅛ in. wide: flowers lilac, the buds strictly opposite, the clusters cylindric, 1 in. or less long, the axis growing out as a leafy shoot, or the clusters globose and terminal or lateral when the flowers are sterile: stamens ¼ in. long, shortly united into bundles of 10 to 15 each: capsule partially embedded in the woody stem. Illustrations: Pl. 4, fig. 1; *Bot. Mag.*, pl. 2268.

Common in California gardens but suitable only for large grounds and parks.

7. **M. leucadendron** L. *M. cajaputi* Roxb. CAJUPUT TREE. PUNK TREE.

A large tree with thick spongy bark which peels off in layers, and pendulous branchlets, either entirely glabrous or the young shoots silky: leaves alternate, elliptic or oblong, tapering to each end, usually 2 to 4 in. long (rarely even 8 in.) and ½ to ¾ in. wide, with 3 to 7 parallel nerves and numerous cross-veinlets: flowering spikes creamy white (varying to pink and purple in Australia), 1½ to 4 in. long, 1 in. wide, at first terminal, the axis growing out only after flowering: stamens nearly ½ in. long. Illustrations: Pl. 4, fig. 3; Cav. *Icon.*, pl. 333 (as *Metrosideros quinquenervia*); Maiden, *Forest Fl. N. S. W.*, pl. 15; *Bot. Cook's First Voy.*, pl. 112.

This tree, which resembles some of the Acacias, is grown sparingly in Southern California. The largest specimen (about 20 years old) is at the Coronado Nurseries and measures 40 feet in height, the trunk is 14 inches in diameter, and the soft bark ¾ to 1½ inches thick. The wood is said to possess "a most beautiful combination of light and darker shades, which may be compared in appearance to ripple marks" (Maiden), and to be hard, heavy, close-grained, and imperishable underground. The tree withstands the effect of salt water by means of its thick, impervious bark. The leaves of certain forms yield cajuput oil, an article of commerce used in medicine.

8. **M. styphelioides** Sm.

Becoming a tall tree, with thick spongy bark; young shoots and inflorescence silky, the herbage otherwise glabrous: leaves alternate, ovate, sessile by a broad base, tapering above to a sharp rigid tip, usually more or less twisted, ⅝ in. long, nearly ¼ in. wide, striate with numerous fine nerves: flower-clusters creamy-white, dense, 1 or 2 in. long, nearly 1 in. wide, the axis growing out before flowering is over: stamens slightly exceeding ¼ in. in length: capsule globular, crowned by the persistent calyx-teeth. Illustration: Pl. 4, fig. 4.

Cultivated, so far as I know, only around San Diego but should be more generally used. The largest specimens are now large shrubs of neat appearance and with much clean, thrifty growth.

9. **M. armillaris** Sm.

A tall shrub, of graceful habit, glabrous throughout: bark gray, firm, furrowed, deciduous in narrow strips: leaves densely clothing the long slender twigs, alternate, narrowly linear, the tip very slender and usually curved outward, ½ to ¾ in. long, less than 1/16 in. wide: flower-clusters white, cylindric, over 2 in. long when well developed, ¾ in. wide, the axis protruding and leafy before the buds open: stamens ¼ in. long, the ribbon-like claw about as long as the free filaments: capsule with broad base partly embedded in the stem. Illustrations: Pl. 4, fig. 2; pl. 6; Cav. *Icon.*, pl. 335 (bad); *Bot. Cook's First Voy.*, p. 114.

This I consider the best of the white-flowered sorts. Especially suited to shrubberies and borders of broad walks where something graceful is desired. By means of a little heading in it may be made to assume a rounded form with many slender, drooping branchlets, each densely clothed with the abundant narrow foliage. This absence of barren twigs and of knotted fruit-clusters is one of its chief advantages. Specimens have grown to a height of 7 feet in two years at Santa Barbara, while shrubs 20 years old at Coronado are only 15 feet high. Much used at West Lake Park, Los Angeles, often as a shelter for the park benches. Does fully as well at San Mateo, San Francisco, etc., but perhaps of slower growth. Said to attain 20 to 30 feet in Australia. Often called *M. alba* in California gardens.

10. **M. parviflora** Lindl. *M. Preissiana* Schau.

A tree or tall shrub, glabrous or the young parts pubescent: leaves alternate, thick, rigid, lanceolate or oblong-linear, sharp-pointed, ½ in. long or rather less, obscurely if at all nerved: flower-clusters white, loose, 1 in. or less long, capsule globose (narrowed to the base). Illustration: Pl. 5, fig. 1.

A hardy shrub, grown both in central and southern California, but much surpassed, as regards beauty, by other species. *M. armillaris* and *M. ericifolia* are often erroneously labeled *M. Preissiana* in California gardens; but this last name is only a synonym of *M. parviflora.*

11. **M. Huegelii** Endl.

An erect rigid shrub, 6 to 12 ft. high, with firm, pale bark, nearly glabrous: leaves alternate, spirally arranged and overlapping, strictly sessile, ovate, contracted above to a sharp point, ¼ in. or less long, striate with 3 to 7 nerves: flower-clusters white (the buds sometimes pink), dense, 1 to 5 in. long, about ¾ in. wide, the axis growing out before the buds open: stamens ⅜ in. long, the claw conspicuous and divided at the end into 7 to 11 filaments: capsules globular, crowded in a cylindric spike. Illustration: Pl. 5, fig. 5.

Frequent in southern California shrubberies where valuable chiefly because of its oddity. At Soldiers Home many of the branches fasciate, forming flat, leafy ribbons.

12. **M. ericifolia** Sm.

A large shrub or small tree, either glabrous or pubescent, the bark thick and soft: leaves alternate, not rigid, usually recurved from the middle, narrowly linear or nearly cylindric, rather obtuse, about ½ in. long; flowering spikes yellowish-white (there is a roseate variety in Australia), ½ to 1 in. long and ⅜ in. wide, the rachis soon growing out and leafy, or the flowers sometimes in nearly globular terminal heads (staminate): stamens ¼ in. long, the claws conspicuous and with about 7 filaments at the end: capsules truncate, in a dense spike. Illustration: Pl. 5, fig. 3.

A slender shrub resembling heath (Erica). Not much used in California. A few arboreous specimens may be seen on the lawns near the conservatory of Golden Gate Park, San Francisco.

13. **M. nesophila** F. Muell.

A glabrous shrub or small tree, attaining 35 ft. in California, with thick spongy bark which exfoliates in broad strips: leaves alternate, obovate-oblong, obtuse or with a sharp tip, thick, ½ to 1 in. long, about

¼ in. wide, obscurely 1- or 3-nerved: flowers pink or rose-color, in dense terminal heads 1 in. or more in diameter, the axis seldom growing out before flowering is over: claw of the stamens short: capsules smooth, congested in a globose or ovoid mass. Illustration: Pl. 5, fig. 4.

Suitable for parks and other large grounds. A very rapid grower and makes a fair shade, but the capsules, which form knot-like excrescences on the exposed branches, are objectionable.

14. **M. nodosa** Sm.

A tall nearly glabrous shrub: leaves linear or subulate, rigid, straight and rigidly sharp-pointed, ½ to ¾ or 1 in. long: flowers pale yellow, in numerous dense globular clusters which are scarcely ½ in. in diameter, the axis not growing out until after flowering: capsules in small compact heads scarcely more than ¼ in. across. Illustrations: Pl. 5, fig. 2; Cav. *Icon.*, pl. 334; *Bot. Cook's First Voy.*, pl. 115.

Rare in cultivation. Grown in Golden Gate Park.

15. **M. incana** R. Br.

A tall shrub, the young twigs and flowering branches ashy with a fine close pubescence: leaves alternate or sometimes opposite, spreading, linear to lanceolate, acute, ¼ to ½ in. long, hoary with white hairs at least when young, mostly 1-nerved: flowers yellowish white, in dense terminal ovoid or oblong spikes about ¾ in. wide, the axis rarely growing out until after flowering: stamens shortly united in bundles of 3 to 9: capsules in dense cylindrical spikes ¾ to 1 in. long. Illustrations: Fig. 14; *Bot. Reg.*, pl. 410.

Reported as growing in Golden Gate Park. A beautiful specimen with pendant twigs may be seen in the "Arizona Garden," on the Hotel del Monte grounds, Monterey.

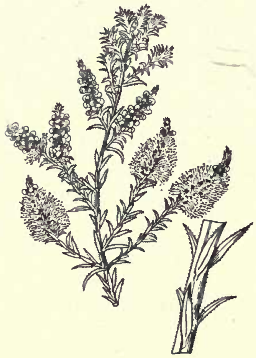

Fig. 14.—*Melaleuca incana.*

16. **M. micromeria** Schau.

A tall shrub with many short slender branches, covered by a short close white tomentum which is often concealed by the minute foliage: leaves exceedingly minute, mostly in whorls of 3, closely appressed to the stem, ovate, scale-like: flowers in small globular heads about ¼ in. in diameter: capsules in dense clusters less than ½ in. across.

Once grown at Santa Barbara by Dr. Franceschi but probably no longer in cultivation in California.

LEPTOSPERMUM.

This is a genus of shrubs and small trees, with small, entire, alternate leaves and mostly white flowers on short lateral branches. All of our species are from Australia except *L. ericoides,* which is a native of New Zealand, and *L. scoparium,* which occurs both in Australia and New Zealand.

The only one to be recommended for general planting is the well known *L. laevigatum,* the others being in no way superior and of value chiefly as novelties. This species, however, grows rapidly and soon makes a spreading shrub 8 to 12 feet high, which is laden during the spring months with a profusion of white bloom. It is particularly adapted to mass planting in large parks and for filling in unsightly corners. Because of its drought resistant properties and its rapid growth, it should be experimented with as a shrub for reforesting purposes in our foothill districts. In case a larger plant is desired, *L. fabricia* may be used, since it is reported as becoming quite arboreous in Australia. *L. flavescens* is much grown in Europe and its var. *grandiflorum* has flowers of the largest. *L. scoparium* is a shrub, rarely attaining 12 feet. When the leaves are exceedingly narrow it is called *L. juniperinum.* Its flowers are sometimes pink or even red. *L. ericoides* is one of the ''tea trees'' of New Zealand, sometimes growing to a height of 40 to 60 feet, with a trunk sufficiently large to be used for piling, fence posts, etc., and would probably grow without care on our lower hills.

Propagation is effected by use of the seeds although these are not always fertile. Cuttings from young wood are more satisfactory and are grown under glass. All of the species are hardy for California and endure drought well.

Key to the cultivated Species of Leptospermum.

A. Ovary and capsule 6- to 10-celled: fertile seeds rather broadly winged.

Calyx glabrous: leaves broad, obtuse, ½ to 1 in. long: flowers large .... 1. *L. laevigatum* Muell.
Calyx villous: otherwise similar .... 2. *L. fabricia* Benth.

B. Ovary 5-celled: seeds linear.

Calyx glabrous.
Leaves obtuse, ¼ to ¾ in. long: flowers of medium size .... 3. *L. flavescens* Sm.

Leaves acute, narrow.
  Flowers ⅓ to ¾ in. across: leaves with rigid tips ....4. *L. scoparium* Forst.
  Flowers ¼ in. across: leaves small, dense, heath-like, the tips not rigid ....5. *L. ericoides* A. Rich.

Calyx pubescent with long hairs.
  Calyx broad and obtuse at the base, villous with long hairs: leaves linear, or elliptic, or obovate, obtuse or with a short sharp tip ....6. *L. lanigerum* Sm.
  Calyx attenuate at the base (at least when young), silky with appressed hairs: leaves small, obovate or oblong ....7. *L. myrtifolium* Sieb.

Since only one or two species of Leptospermum are grown in California to any considerable extent, the detailed botanical descriptions are omitted.

AGONIS.

One species of Agonis is grown in California, namely *A. flexuosa* Schau., of which good examples may be seen in Golden Gate Park and at Soldiers Home, near Los Angeles. The shrub is commonly mistaken for a Leptospermum but is much more graceful in habit and with longer, more slender leaves. Very serviceable where a pendant effect is desired rather than a show of bloom.

METROSIDEROS.

This genus includes two magnificent New Zealand trees, grown in California to a limited extent. They may be known by their large size, the thick and leathery strictly opposite leaves, and the rounded, terminal flower-clusters rendered brilliant by the profusion of long-exserted, crimson stamens. In *M. robusta* A. Cunn. the leaves are glabrous and 1 to 1½ inches long; in *M. tomentosa* A. Rich. they are usually clothed beneath with white hairs and are mostly 2 to 4 inches long.

Metrosideros may be used either as an ornamental shrub or as an avenue tree. It is easily propagated by means of cuttings since it is disposed to throw out roots, even on the main branches. In New Zealand "it commonly commences life as an epiphyte, in the upper branches of some tall forest tree, sending to the ground aerial roots which coalesce and form a trunk after the death of the supporting plant" (Cheeseman).

These trees are not hardy, and although grown at San Francisco will not endure a temperature much below the freezing point.

Several species of Callistemon are known in trade as Metrosideros. The so-called *M. semperflorens* and *M. latifolius* are mostly *Callistemon lanceolatus. M. speciosus* is *Callistemon speciosus.*

CALOTHAMNUS.

Although often confused with Melaleuca, this genus is at once distinguished by the anthers, which are erect and attached by the very base to the summit of the filament. Our only common species in cultivation is *C. quadrifidus* R. Br., of Australia, a low shrub with cylindric, punctate leaves and clustered crimson flowers with long stamens united into bundles. Its uses and methods of propagation are similar to those given for Callistemon.

MISCELLANEOUS ORNAMENTALS.

Lyonothamnus floribundus var. **asplenifolius** Brandegee.

ISLAND IRONWOOD.

An erect, evergreen tree, becoming 75 ft. high, with very heavy and dark wood and a loose red bark which exfoliates in long ribbon-like strips: leaves fern-like, opposite, stalked, mostly parted into several narrowly oblong or lanceolate segments, each segment 3 or 4 in. long and cut to near the midrib into many shield-shaped lobes (mostly simple and nearly entire in typical *L. floribundus*), white-tomentose beneath or glabrous: flowers white, small, but the clusters dense and 4 to 8 in. across: sepals and petals 5 each: stamens 15: pistils 2, distinct: seeds usually 4, minute. Family Rosaceae. Santa Barbara Islands. Illustrations: Fig. 15; pl. 7; *Zoe,* i, pl. 5; Sudworth, *Forest Trees Pacif. Slope,* figs. 154, 155; Sargent, *Silva,* pl. 197; Sargent, *Man. Trees N. A.,* fig. 275.

Lyonothamnus is, in many respects, the most remarkable contribution that California has made to the world's list of ornamental trees. It is known native only on Santa Cruz, Santa Rosa, Santa Catalina, and San Clemente islands, and was first brought to the mainland in 1894 by Dr. Franceschi, of Santa Barbara. In that year one live stump and a quantity of seeds were procured on Santa Cruz Island. The former was planted on State street, Santa Barbara, where it produced a tree about

35 feet high in 16 years. Several plants were obtained from the seed. At least two of these (one on the Gillespie grounds, Montecito, one at the Cooper Ranch, Elwood) bloomed when 13 years old. Another tree of this same generation is growing vigorously on the University Campus at Berkeley and now, at 15 years of age, is in bloom for the first time. It measures 45 feet high, and has a trunk diameter of 10 inches. Because of its beauty and symmetry, as well as its botanical interest, it is justly considered the pride of the garden.

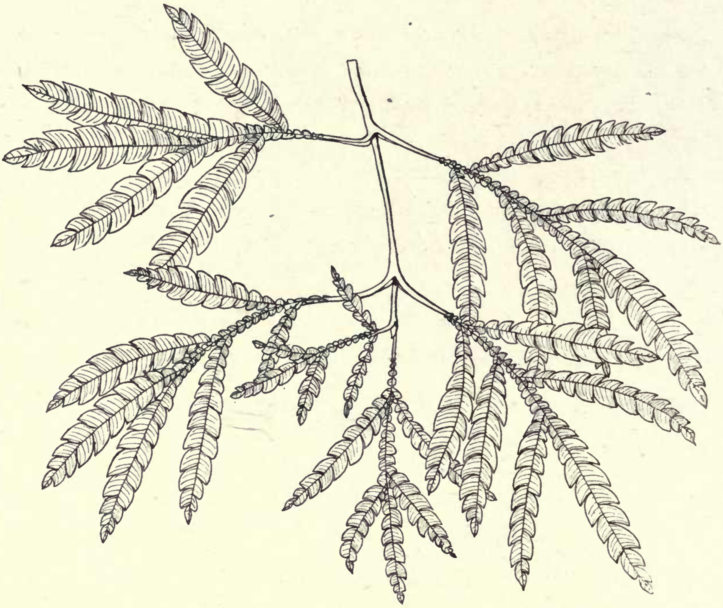

Fig. 15.—*Lyonothamnus floribundus.*

The ornamental uses which can be made of this tree are numerous. It harmonizes well with almost any combination of surroundings, but is not adapted to small grounds. The tall, stately habit adds dignity to any environment, while the dense and gracefully drooping foliage forbids any suggestion of rigidity or coldness, and when covered with the copious white bloom the tree is certainly a pleasing sight. As a specimen tree for large grounds, parks, and the like it is unexcelled, particularly if plenty of room is given it, in order that there may be a symmetrical development and that the general outline may be brought out.

Lyonothamnus is especially recommended as an avenue tree. The erect habit of growth, moderate spread, and narrow crown, would combine with the graceful foliage in making an avenue of these trees one of the most dignified and pleasing drives in the state. It is hoped that the supply will soon be sufficiently adequate to warrant their utilization for this purpose.

Objection has been made to it as a lawn tree because of the litter produced, but healthy trees cast no appreciable amount of litter. When grown on lawns, the ground directly under the tree should be cultivated. The only further objection that I have heard is that it harbors black scale, this reason being given for its scarcity at Los Angeles. This objection, however, is not a serious one, since black scale is now readily held in check by certain animal parasites. Trees at Santa Barbara and at Berkeley are not infested with scale to any noticeable extent.

Concerning the conditions under which Lyonothamnus may be expected to thrive, we can only say that, so far as tried, there have been no failures. These trials have been mostly in the coast districts. The interior may be too dry for its best development, but this point has not yet been tested. Perhaps the best specimen in cultivation is the one on the Reed grounds at Pasadena, where the summers are quite warm and dry. Its hardiness is likewise unknown, but temperatures of 25° F. have not affected the foliage whatever.

In its natural habitat, Lyonothamnus grows on well drained soil which is moderately moist. The groves, so far as I have observed, are always on north slopes, but neither in cañon bottoms nor on the wind-swept ridges. These groves are of very limited size, mostly covering less than an acre of land, and of limited number. Seedlings, moreover, are entirely wanting, all of the trees being apparently second growth, that is, suckers from old stumps. Even where the old stumps are not found, the trees are frequently arranged in an irregular circle, the center of which was perhaps once occupied by the parent tree. Only a very small percentage of the seeds are fertile and nurserymen who have propagated them have had much difficulty because of the readiness with which the young seedlings damped off. All of these facts, together with the isolation of the genus from all related forms, seem to indicate that we have here a decadent race, marooned on these few islands where its last stand in the fight for existence is being made.

That this race of trees will become extinct unless protected is a certainty. Steps should be taken, either by the State or Federal Government, to acquire and protect at least a few of the groves. An important factor in the weakening of this race is doubtless that of inbreeding. There are apparently no special devices for cross pollination and, judging from the botanical characters of the two forms, there is almost certainly no transfer of pollen from one island to another. If artificial cross pollination were practiced between the typical form and the var. *asplenifolius,* a good yield of fertile seed would probably result and give rise to a stronger race. At least, the experiment should be made.

Propagation is best effected by seed. These are largely infertile, so that only a small percentage can be expected to germinate. In the past, this seed has all come from Santa Cruz Island, but cultivated trees at Santa Barbara are now yielding a more convenient supply. In propagating from seed, great care must be exercised to see that the seedlings do not damp off in the early stages. Stumps have been successfully transplanted but their shipment from the islands is expensive. They may be divided by splitting, but experience has shown this to be a precarious proceeding. All attempts at layering and propagation by means of cuttings have failed up to the present time.

Eugenia myrtifolia Sims.[2]

AUSTRALIAN BRUSH CHERRY.

An evergreen glabrous tree, or shrub-like: leaves opposite, oval or oblong, narrowed to each end, short-stalked, mostly acute, entire, 1½ to 3 in. long: flowers in loose clusters: calyx-tube top-shaped, the lobes unequal: petals 4, white, ¼ in. across: stamens numerous: ovary inferior: style single: fruit red, ovoid, nearly 1 in. long, fleshy, of a pleasing acid taste. Family Myrtaceae. Australia. Illustrations: Pl. 8; *Bot. Mag.*, pl. 2230.

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[2] Some confusion has arisen because of the various names applied to this tree. *Eugenia australis* Wendl. is exactly the same, according to best authorities. *Jambos myrtifolia* Nadz. is the name adopted in Engler and Prantl's *Natürlichenpflanzenfamilien.*

This tree may be used as a hedge plant, as a shrub for the lawn or garden, as a specimen tree for large grounds, or as a street tree, and is perhaps the best of the whole list for general planting. The habit is dignified, yet graceful and pleasing. Its leaves are plentiful, clean, glossy, and green. It prunes well, and so may be molded to harmonize with its surroundings. Eugenia is hardy for all of the coast district of California, grows well as far north as Sacramento (and there is no reason why it should not be used much beyond this latitude), and in the interior at least as far as Redlands.

When it is desired to form a tall, narrow hedge, the plants should be set close together. If a shrub is desired, the growth of several central stems should be encouraged and the head cut back. Even so it will insist on becoming a tree in favorable localities, in which case it will be necessary to resort to root pruning.

Growth is not rapid, although one specimen at Coronado attained a height of 40 feet in 20 years. At Santa Barbara a tree 80 feet high was observed, but the age is not known. On the San Francisco Peninsula it is commonly grown in masses and therefore remains low. A good example, 20 feet high, may be seen on the Capitol grounds at Sacramento.

As a street tree, *Eugenia myrtifolia* would almost certainly be a splendid success. The difficulty of procuring a large supply of trees has prevented its use for this purpose, but they are now sufficiently plentiful to warrant its adoption for some of our more progressive cities.

Propagation is easily accomplished from seeds, but these are not to be had in large quantities. Cuttings taken from firm or partially ripened wood strike without difficulty.

Macadamia ternifolia F. Muell.

AUSTRALIAN NUT.

A slender glabrous tree, becoming 50 ft. high: leaves in whorls of 3 or 4, or the upper ones more scattered, oblong or lanceolate, acutish,

short-stalked or sessile, serrate with remote sharp slender teeth or entire, several inches to 1 ft. or more long: flowers small, in long racemes, growing in pairs on short stalks: ovary simple, developing into a hard-shelled ovoid nut with a leathery covering. Family Proteaceae. Australia.

Valuable chiefly because of its nuts, this tree also deserves consideration as an ornamental. It is a clean, straight-growing, pleasing tree, without objectionable features, and is suggested as a specimen tree for parks and large gardens and also as a nut tree, both for commercial plantations and for the home orchard.

Specimens are growing at San Francisco and Berkeley, but none of these have yet blossomed, so far as I am aware. This may be due to excessive shading or crowding or to unfavorable soil conditions. At Santa Barbara we find several splendid trees. One of these, now about five years old, is 15 feet high and bearing nuts, although it has had no attention. Another, on the Gillespie grounds at Montecito, is eleven years old and has borne several crops. This tree, although on poor soil and much crowded, is now about 50 feet high and still growing. Some of its branches are 10 feet long, the lower ones sweeping the ground, the shorter upper ones ascending, the whole appearance being that of a thrifty, well established specimen, a credit to any garden.

The flowers appear in December and the blooming period extends into March, the nuts ripening the next autumn. These nuts are borne in long, pendant racemes of 6 to 24 nuts each. Only the larger ones are fertile and the extremely hard shell renders the cracking of the nuts a difficult operation. They resemble filberts somewhat in appearance and taste but are said to excel all other nuts in flavor and to sell in the English market at $2.50 per pound. In Australia the price averages $1.25 per pound, when sold for propagation purposes. Australian writers inform us, further, that the trees are there planted 20 feet apart, attain a height of 50 feet, come into bearing when seven years old, and yield 3 to 14 nuts to each raceme. It would seem that some parts of California are fully as well adapted to the tree as any part of Australia, where the production of its nuts is considered to be very remunerative.

Maytenus Boaria Mol.

MAYTEN.

A glabrous evergreen tree of graceful habit, 15 to 40 ft. high or more, the crown broad and spreading, the slender branchlets pendant: leaves alternate, lanceolate, much narrowed to each end, finely and evenly serrate, 1 to 1½ in. long: flowers small, greenish, in small clusters along the leafy branchlets, the staminate with calyx-teeth petals and stamens 5 each: capsule splitting into 2 widely spreading valves: seeds with a scarlet aril. Synonym: *M. chilensis* DC. Family Celastraceae. Chile, northern Patagonia, etc. Illustrations: Pl. 9; *Bot. Reg.*, xx, pl. 1702; Bailey, fig. 1382.

The Chilean Mayten may now be seen at a number of places in California, and is becoming more and more a favorite. Its chief claims for consideration are its graceful habit and delicate smilax-like foliage. Because of the rounded top, pendant twigs, and modest color, it harmonizes well with other shrubs and trees, except those of a rigid, pyramidal habit. The twigs have been used for interior decoration with good results, and when woven into the meshes of a large net the effect is very suggestive of a bank of smilax.

This tree endures pruning well and when the lower branches are removed makes a fair shade tree, where the densest of shade is not desired. It is well adapted to lawn planting and is most beautiful when the branches are allowed to sweep the sward. Being a slow grower it is well adapted to places where tall trees are objectionable, and by occasionally removing the topmost growths, it may be kept as a shrub for 10 or 15 years. A lawn specimen in Berkeley has grown to a height of 15 feet in 7 years, while trees about 20 years old are 30 to 35 feet high. At Pasadena one of these plants grew 12 feet in 3 years.

Although seldom seen as a street tree, there is little doubt that the Mayten will prove itself useful for this purpose on rather wide streets where evergreens are desired. It will need attention, however, to prevent the central shaft from dividing into several branches. All but one of these should be removed as soon as formed.

The Mayten flourishes equally well in middle and in Southern California, along the coast and in the interior. It is propagated from cuttings taken in the fall, or from seed. Volunteer seedlings are not uncommon under old trees and root-suckers also appear in some cases.

Roupala Pohlii Meisn.

ROUPALA.

A tall narrow evergreen tree with smooth gray and somewhat mottled bark, the young shoots and leaves rusty with numerous woolly hairs, the mature foliage glabrous, glossy and dark green: leaves compound, 1 ft. or more long; leaflets 5 to 8 pairs, short-stalked, ovate, acuminate, oblique at base, 4 or 5 in. long, about 2 in. broad, coarsely toothed: flowers yellowish, in erect racemes which are 3 to 5 in. long: perianth with 4 narrow lobes: ovary and style single: fruit a hard 2-valved capsule. Synonym: *R. corcovadensis* Hort. Family Proteaceae. Brazil. Illustration: *Bot. Mag.*, pl. 6095.

Of the three or four specimens in California of this strikingly handsome plant, the finest is perhaps the tree on the Gillespie place at Montecito, near Santa Barbara. This is now 13 years old, but was once broken off by the wind; the present height of 30 feet represents the growth of about 7 years.

The foliage of this tree is unlike that of any other and constitutes its chief charm. The long, compound leaves curve gracefully outward, many of them becoming pendant, and thus the tree is clothed with a shining mantle of green. The young shoots, bronzed throughout with a soft, rusty tomentum, add color to the foliage during the spring months.

Roupala is a tree for only a few gardens, being somewhat sensitive to frost and easily broken by winds. A warm, sheltered place should therefore be chosen. It is, moreover, difficult to procure. Experiments with cuttings have so far failed and seeds can be had only by importation from Brazil. Further trials with cuttings should be made, since this method is apparently successful in England, the cuttings being "inserted in sand, under glass, with bottom heat" (Nicholson).

Choisya ternata HBK.

CHOISYA.

A compact free-blooming bush, 3 to 5 ft. high (said to reach 10 ft. when trained against warm walls), the young parts minutely hairy: leaves opposite, compound, the common petiole ½ to 2 in. long; leaflets

3, narrowly obovate, obtuse, tapering to a sessile base, entire, 1½ to 2½ in. long, marked with minute oil-dots: flowers white, ¾ in. across, in forking terminal clusters: sepals and petals 5 each: stamens 10: pistil solitary. Family Rutaceae. Mexico. Illustrations: Pl. 10; HBK. *Nov. Gen. et Sp.*, pl. 513.

Choisya ternata is perhaps the most desirable small shrub now grown in California, one which has been thoroughly tested in a variety of situations, and yet it is scarcely known outside of a few parks and a limited number of private gardens. It is exceedingly neat and trim in appearance, round-topped, and the leaves are of that smooth, glossy texture which easily sheds dust and keeps clean even through a long, dry summer. The blossoms, comparable to those of the orange but scarcely fragrant, occur in abundance, five or six "crops" appearing each year, at least when grown in warm situations near the sea. The flowers appear in greatest abundance, however, during the early spring months. Although a native of Mexico, it grows only at considerable altitudes in that republic, and flourishes in California both along the coast and in the interior, from San Diego to San Francisco, and would undoubtedly do well much farther north. It has been known to endure a minimum temperature of 10° F.

Choisya is recommended for small lawns and yards, especially for city lots and for interior courts. In Golden Gate Park, San Francisco, it is used to good effect in masses, one planting of some 200 specimens being especially pleasing when in full bloom. This shrub is said to be grown in England as a hedge plant, such hedges being as broad as high, round-topped, and quite satisfactory whether in flower or only in foliage.

Propagation is by means of cuttings taken between the periods of bloom. Fertile seeds rarely form on cultivated plants, and their importation is impracticable. Choisya was first described from cultivated plants whose exact origin was unknown. It has since been discovered in the vicinity of San Luis Tultitlanapa, near Oaxaca, and elsewhere in Mexico.

Streptosolen Jamesonii Miers.

STREPTOSOLEN.

An evergreen rough-pubescent shrub, usually 3 to 6 ft. high: leaves short-stalked, oval, narrowed to each end, entire, ¾ to 1½ in. long: flowers showy, rich orange, in loose terminal clusters: calyx tubular, 5-toothed: corolla tubular-campanulate, 5-lobed, 1 in. long, ½ to ¾ in. wide across the expanded limb, the tube twisted below: perfect stamens 4: capsule 4-lobed. Synonym: *Browallia Jamesonii* Hort. Family Solanaceae. U. S. of Columbia. Illustrations: *Bot. Mag.*, pl. 4605; Bailey, fig. 2436.

Commonly grown as a flowering shrub, Streptosolen is equally satisfactory when trained against walls or on a trellis, since in habit it is half-climbing. Left to itself it spreads out into irregular but graceful masses 15 or 20 feet across and 4 to 6 feet high; if taken in hand when young and carefully pruned it may be made to assume an upright form with a more or less distinct trunk, and has been trained on walls to heights of 10 feet or more. Whatever the habit, it blooms profusely at all seasons and is especially adapted to situations calling for masses of color during the winter months. Partial shade does not seem to discourage this shrub, for in San Mateo County I have seen it blooming profusely beneath oak trees in April. A light soil is necessary for its best development. It is therefore recommended for almost any situation where the color harmonizes with its surroundings and where the temperature does not fall much below the freezing point. It might well replace much of the Lantana so commonly grown in California.

It must be remembered, however, that Streptosolen is a tender plant. It sometimes freezes in the San Francisco Bay district, but only when grown on low ground. In the coastal region from San Luis Obispo south it is perfectly safe except in the coldest situations. It is used as far inland as Redlands, but at that place it is necessary to select warm situations.

Cuttings grow readily and afford a very satisfactory method of propagation. In England cuttings are struck in the spring and grown in 10-inch pots without pinching, the result being tall plants for the greenhouse, clothed with fine trusses of bloom during the winter months. (See further in *Gardeners' Chronicle,* ser. 3, xxxi, 84 and xxxvii, 375.)

Solanum Rantonnetii Carr.

BLUE-FLOWERED SOLANUM.

An erect bushy plant, 4 to 10 ft. high, or may be trained as a vine to 15 ft.: leaves soft with microscopic hairs, alternate, lanceolate, narrowed to each end, entire, very variable in size: flowers slender-stalked, violet-blue, nearly 1 in. across: calyx 5-toothed: corolla rotate, 5-angled: stamens 5, attached to the corolla, the anthers oblong and connivent: fruit a 2-celled berry, red, drooping, very ornamental, many-seeded. Family Solanaceae. Paraguay and Argentine. Illustration: Pl. 11, fig. 1.

This plant, which may be considered either as a shrub or as a vine, depending upon the method of pruning, is being successfully grown in a number of southern California gardens. It is recommended for situations where a mass of blue color is desired at all seasons of the year, since it is a continuous as well as a profuse bloomer, the flowers forming in clusters over nearly all the exposed area.

The growth is rapid and a single vine has been known to make an almost solid wall 15 feet long by 12 feet high. Its effectiveness is increased by planting with it some yellow-flowered vine.

When treated as a shrub, *Solanum Rantonnetii* produces a solid mass of foliage and many flowers. For this purpose the lower branches should be pruned back and the whole plant headed in occasionally. Only moderate irrigation is to be practiced if an abundance of bloom is desired, since ordinary watering, such as is given to most shrubs, has a tendency to check its flowering proclivities. It is eminently adapted to dry situations.

Propagation is easily accomplished by means of cuttings. It also comes readily from seed.

Other species of Solanum are better known in cultivation. *S. jasminoides*, often called "potato vine," is the most popular. It is noted for its large clusters of white flowers, but sometimes has a tendency to cast its leaves and thus become ragged or twiggy.

Buddleia madagascariensis Lam.

MADAGASCAR BUDDLEIA.

A loose straggling shrub (but easily controlled by pruning), becoming 15 to 20 ft. high, the stems petioles pedicels and under surface of the leaves clothed with a dense rusty tomentum: leaves green above, opposite, ovate-lanceolate, acuminate, tapering or rounded to short stalks, entire or nearly so, often 6 in. long: flowers fragrant, of a yellowish orange color, borne in long slender trusses which are frequently pendant: calyx shortly 4-toothed: corolla funnel-shaped, the tube about ¼ in. long, cottony, the 4 lobes short and roundish: stamens 4, inserted at the mouth of the corolla-tube: style single, as long as the stamens: berries of a beautiful translucent blue color. Family Loganiaceae. Madagascar. Illustrations: *Bot. Reg.*, xv, pl. 1259; *Bot. Mag.*, pl. 2824.

This Buddleia is cultivated only to a limited extent in California, where it was first introduced by Dr. Franceschi, of Santa Barbara. It may be either trained into an erect, bushy form, or allowed to clamber over other plants, rockeries, or unsightly objects. As a matter of fact, this latter is perhaps its most important use, since it is too coarse for ordinary ''front-yard'' planting and the old flowers, drying to a disagreeable brown, persist long after they have ceased to be ornamental. For certain positions, however, such as filling up odd corners, covering an unsightly water-tank or shed, etc., nothing is more satisfactory.

It is most effective when trained up so that the branches clear the ground; the rounded tops when properly supported may then attain a height of 20 feet and give a spread fully as great.

The growth is rapid and the long, drooping branches, densely clothed with the ashy-gray leaves, present a pleasing sight, to which is added, during the spring and summer months, the brilliancy of the yellow flowers borne profusely in long panicles. These are followed in autumn by the blue berries. The plant is perfectly hardy throughout western California.

Three other species of Buddleia are cultivated in California. The more common of these is *B. globosa*, a low bush with yellow flowers in globular heads. It is a serviceable bedding plant, much used throughout the state and easily grown, but with no special features to commend it. (See *Bot. Mag.*, pl. 174.)

B. Lindleyana is less generally known but has the most beautiful flowers of all. They are of a royal purple color and velvety on the inner surface, in long racemes or panicles, the lower ones dropping off as new buds open. Leaves green on both sides. Half deciduous but hardy and should be freely used. (See *Bot. Reg.*, xxxii, pl. 4.)

B. variabilis may be known by its coarsely serrate leaves, white-cottony beneath, and by the glabrous corolla, which is lilac with an orange-yellow mouth. Rare in California but grown at Goleta and Hollywood. Hardy and a very desirable sort. The var. *Veitchiana* is said to be superior even to the typical form. (See *Bot. Mag.*, pl. 7609.)

The propagation of Buddleias is best carried out by the use of cuttings. This is particularly important if it is desired to exactly reproduce any special form. Such a case is a strain of *B. madagascariensis* which has yellow tomentum and more flowers than the ordinary sort, but does not come true to seed. When trimmed back they branch freely and put out numerous shoots. *B. globosa* is almost weed-like in this respect and sprouts up even if cut back to the root.

Acokanthera spectabilis Benth.

WINTERSWEET.

A trim erect shrub of columnar habit, 4 to 6 ft. high, glabrous almost throughout: leaves leathery, shining above, opposite or alternate, elliptic or broadly lanceolate, very acute, short-stalked, entire, 3 or 4 in. long: flowers jasmine-scented, white tinged with rose or suffused with pink, in dense terminal and axillary clusters, withering-persistent: calyx short, 5-cleft: corolla minutely pubescent without, slenderly tubular, about 1 in. long, the limb parted into 5 lanceolate or ovate lobes: stamens and style included: fruit berry-like, nearly black, the size of a plum. Synonym: *Toxicophlaea spectabilis.* Family Apocynaceae. South Africa. Illustration: *Bot. Mag.*, pl. 6359.

In this shrub we find a true aristocrat. It carries itself with pride and dignity, and like many another exotic which, in the eastern states, demands the solicitude of hot-house culture, is easily grown in southern California as a yard-plant.

Because of its moderate size and slender habit, the Wintersweet is eminently adapted to small yards and lawns. It can be used to good effect in formal planting, either singly or in rows. For this purpose it is much more effective than the European Bay so often used.

Commonly clothed with a rather dense foliage, it is found that in some situations this shrub has a tendency to cast many of its leaves. In this case the twiggy appearance may be remedied by pruning back, thus inducing a growth of new foliage. The flowers are neat and pretty but are withering-persistent. If one is not content to wait a few weeks for them to fall they may easily be plucked by hand (since they grow in clusters) or knocked off with a rake. The fruit is presumably poisonous but it is also exceedingly bitter, so that there is no danger of its being eaten by children or domestic animals. The bark is well known to yield a virulent poison.

The minimum temperature which this plant will endure has not been definitely determined, but it is probably not far below the freezing point. It passes safely through the winters at Santa Barbara and Los Angeles and should be tried on a small scale farther inland and in middle California. It is indifferent to neglect and lack of irrigation.

Propagation is readily effected by seeds. Cuttings are rooted without difficulty.

Feijoa Sellowiana Berg.

FEIJOA.

An erect shrub or small tree, with brown bark: leaves opposite, thick, 2 or 3 in. long and half as broad, oblong, obtuse, short-stemmed, deep green and shining above, white-tomentose beneath: flowers solitary, axillary, 1½ or 2 in. broad, the flower-stalk 1 in. long: calyx-lobes orbicular, reflexed: petals 5, orbicular, spreading, internally blood-red with white margins: stamens numerous, red, the anthers yellow: ovary inferior, 4-celled: fruit oblong, 2 in. long, many-seeded, yellowish green, fleshy, very aromatic. Family Myrtaceae. Southern Brazil, Uruguay, etc. Illustrations: Pl. 11, fig. 2; *Bot. Mag.*, pl. 7620; *Gard. Chron.*, ser. 3, xxiv, fig. 134.

In speaking of ornamental shrubs for California, mention should perhaps be made of this South American fruit, since it is highly ornamental as well as useful. This is not the place to speak of its economic features, but those who are interested in the introduction of new, high-class, money-making fruits, will do well to give attention to the Feijoa, which is certain to become very popular.

The beauty of this shrub lies in its foliage and flowers. The green upper surface of the leaves contrasts finely with the white lower surface, and the parti-colored flowers are strikingly handsome and unusual both in color and form.

Feijoa is much more hardy than the orange, and so may be grown in most of the settled portions of our state. It is not particular as to soil and apparently endures a moderate amount of drought. (See further account in *Pacific Garden* for June, 1908, and for July, 1909.)

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PLATE 1.

Pittosporum phillyraeoides DC. NARROW-LEAVED PITTOSPORUM.

A tree grown at Santa Barbara, California, in a neglected corner. The pendant habit is characteristic and the leaves persistent. Flowers yellowish, inconspicuous.

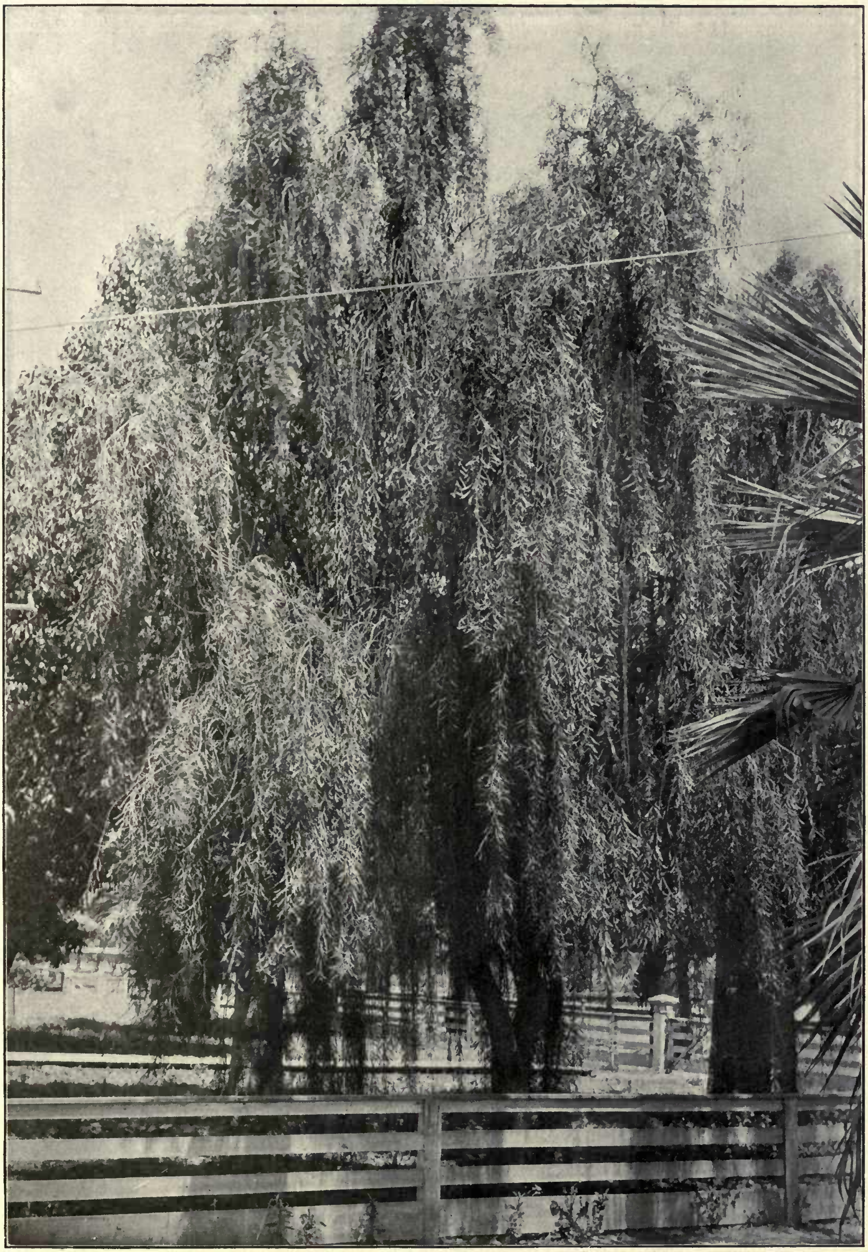


PLATE 2.

Callistemon speciosus DC.

A tree growing in Santa Barbara, California. About twenty years old, forty feet high. Usually only a bush in California. Flower-clusters bright red, large, pendant.

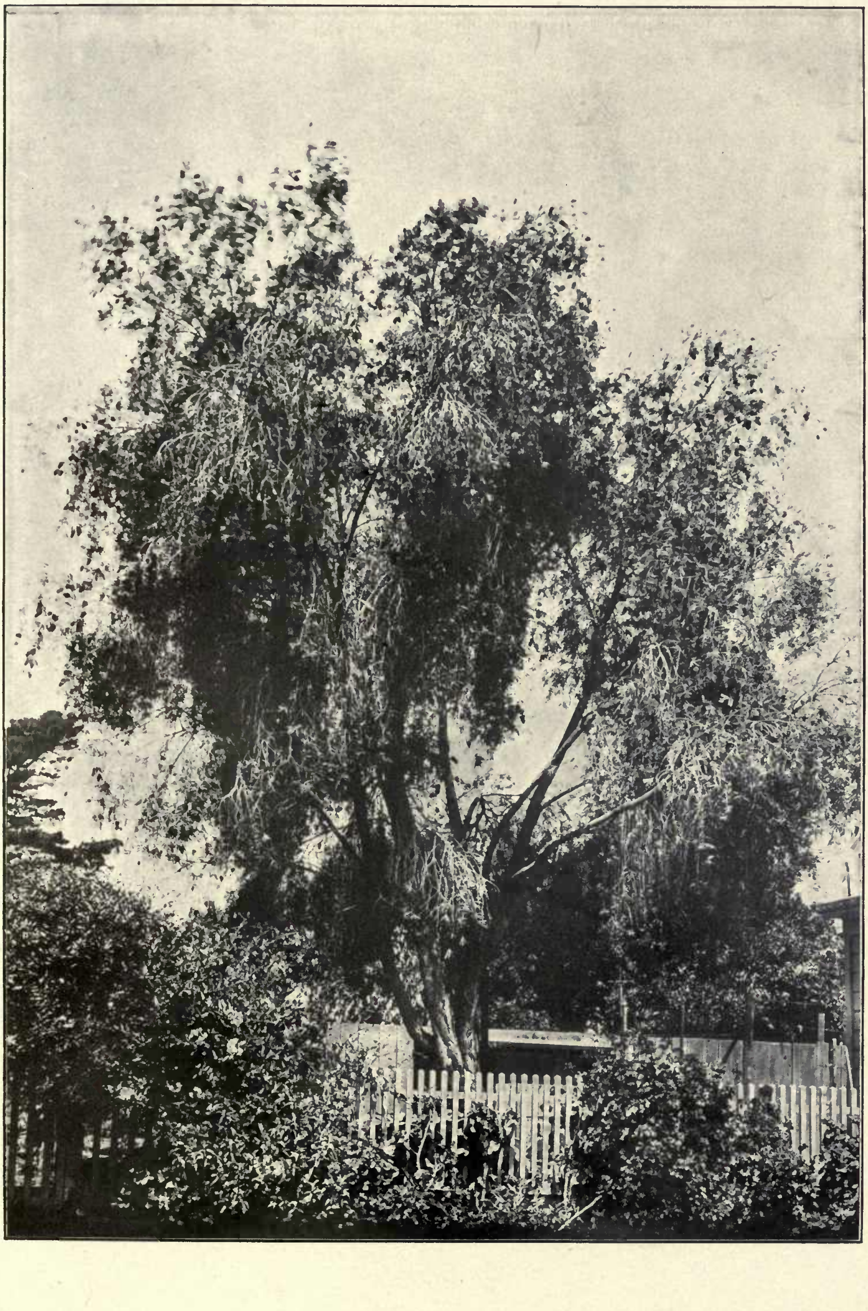


PLATE 3.

1. **Melaleuca hypericifolia** Sm.

a. Flower-cluster. (One-half natural size.)

b. Cluster of old capsules. (Reduced.)

c. Fascicle of stamens. (Somewhat enlarged.)

2. **Melaleuca lateritia** Otto.

a. Flowering branch. (One-half natural size.)

b. Spike of old capsules, showing the spiral arrangement. (One-half natural size.)

c. Four old capsules. (About natural size.)

d. Flower. (Enlarged to one and one-third natural size.)

3. **Melaleuca linariifolia** Sm.

a. Flowering branch. (About natural size.)

b. Branch terminated by five spikes of unopened buds, old capsules below. (About one-half natural size.)

c. Flower. (Enlarged.)

d. Old capsules. (About natural size.)

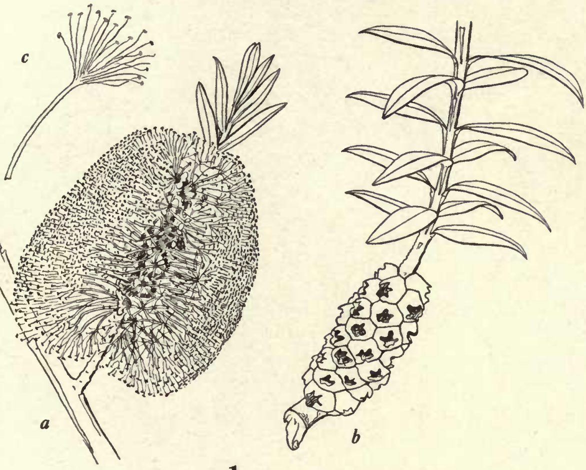
4. **Melaleuca fulgens** R. Br.

a. Branch, showing flower-cluster and a spike of unopened buds.

b. Flower dissected vertically.

c. Pistil.

All drawn from nature by Mrs. Louise Nash, except figure 4, which is from Lindley's *Botanical Register*, plate 103.



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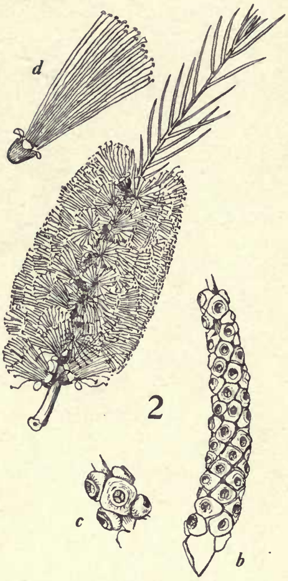

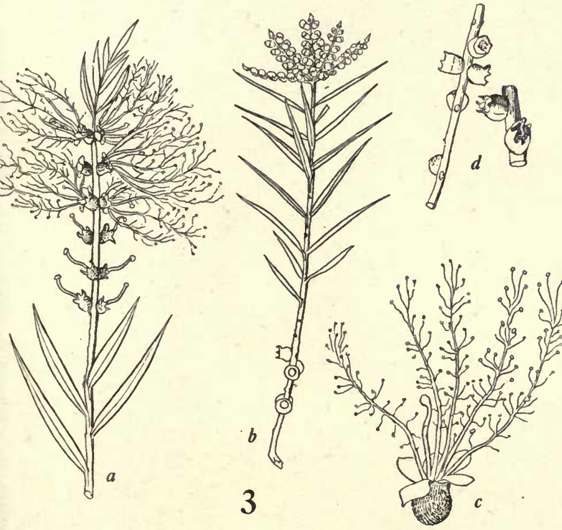

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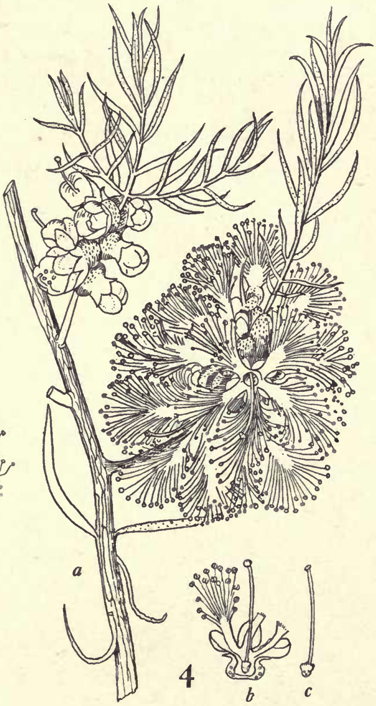

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PLATE 4.

1. **Melaleuca decussata** R. Br.

a. Flowering branch. (Natural size.)

b. Branch with unopened buds showing the decussate arrangement.

c. Flower. (Enlarged.)

d. Petal and a fascicle of nine stamens. (Enlarged.)

e. Twig with old capsules and scars of fallen capsules. (Somewhat reduced.)

2. **Melaleuca armillaris** Sm.

a. Flowering branch. (Reduced to one-half natural size.)

b. Cluster of old capsules. (Nearly natural size.)

c. Leafy branch and cluster of buds with their subtending bracts. (About natural size.)

d. Flower. (Enlarged.)

e. Petal and fascicle of nine stamens. (Enlarged.)

3. **Melaleuca leucadendron** L. CAJUPUT TREE.

a. Flowering branch, with capsules of the previous year below. (One-half natural size.)

b. Three capsules. (Enlarged.)

c. Leaf, showing the venation. (One-half natural size.)

d. Flower. (Enlarged.)

4. **Melaleuca styphelioides** Sm.

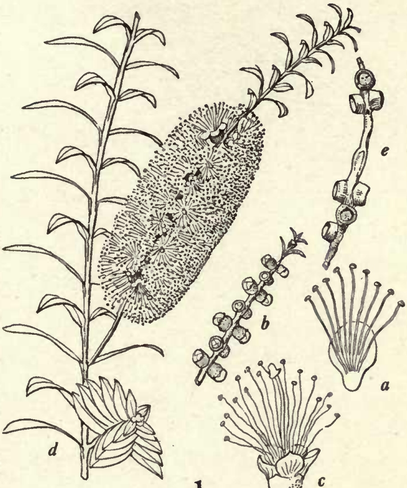
a. Flowering branch. (Natural size.)

b. Branch with unopened buds and a few bracts. (Natural size.)

c. Portion of stem showing the pubescence, and leaf with veins. (Nearly twice natural size.)

d. Flower. (Enlarged.)

All of the figures drawn by Mrs. Louise Nash.



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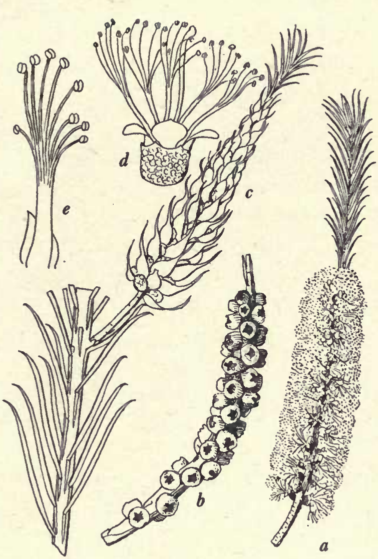

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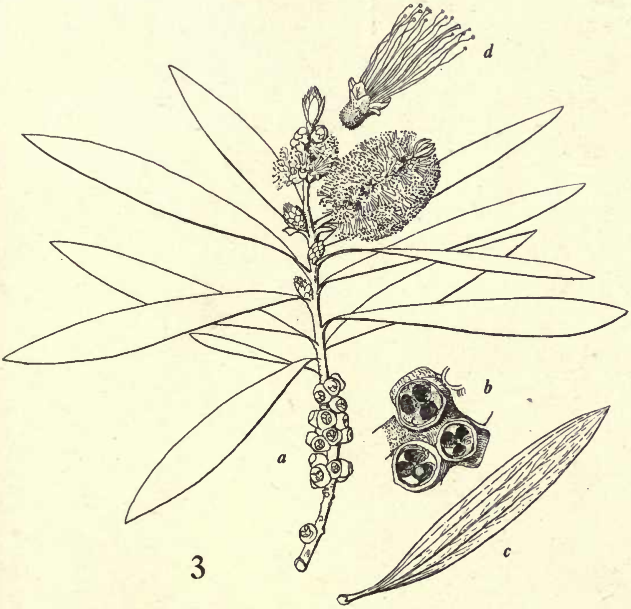

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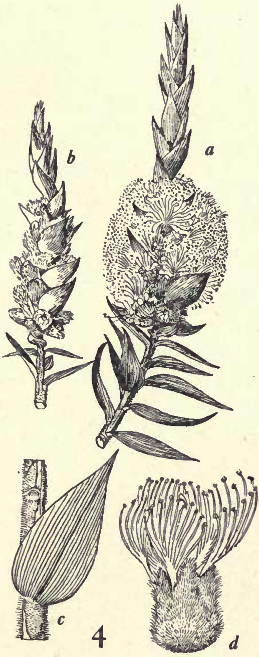

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PLATE 5.

1. **Melaleuca parviflora** Lindl.

a. Flowering branch. (A little more than natural size.)

b. Section of the stem with basal portion of three leaves. (Enlarged.)

c. Single flower. (Enlarged.)

d. Stem with young capsules and a few persistent leaves. (Enlarged.)

e. Old capsules on a stem from which all of the leaves have fallen. (Enlarged.)

2. **Melaleuca nodosa** Sm.

a. Flowering branch with capsules of the previous year at the base. (Natural size.)

b. Single flower. (Enlarged.)

c. Cluster of six stamens. (Enlarged.)

d. Leaf, showing the oil-dots. (Enlarged.)

3. **Melaleuca ericifolia** Sm.

a. Branch, showing capsules of the year on the upper portion, and a cluster of older capsules below. (Natural size.)

b. Capsule seen from above. (Enlarged.)

4. **Melaleuca nesophila** F. Muell.

a. Flowering branch with a cluster of capsules of the previous year at the base. (Reduced to three-fourths natural size.)

b. Fascicle of nine stamens. (Enlarged.)

5. **Melaleuca Huegelii** Endl.

a. Flowering branch with some unopened buds above, and a spike of buds to the right. (About one-half natural size.)

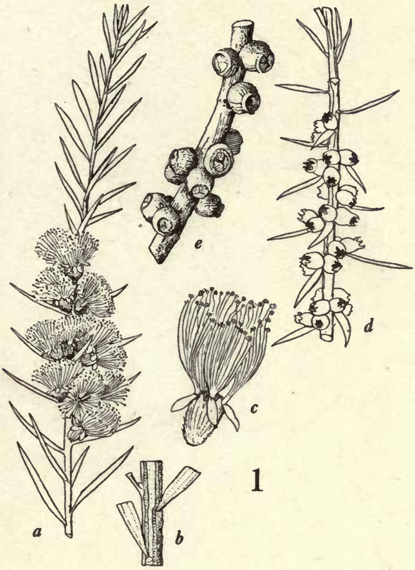
b. Flower. (Enlarged.)

c. Portion of stem showing the appressed leaves. (Enlarged.)

d. Old capsules massed about the stem. (Reduced.)

e. Three capsules. (Enlarged.)

All of the figures drawn by Mrs. Louise Nash.



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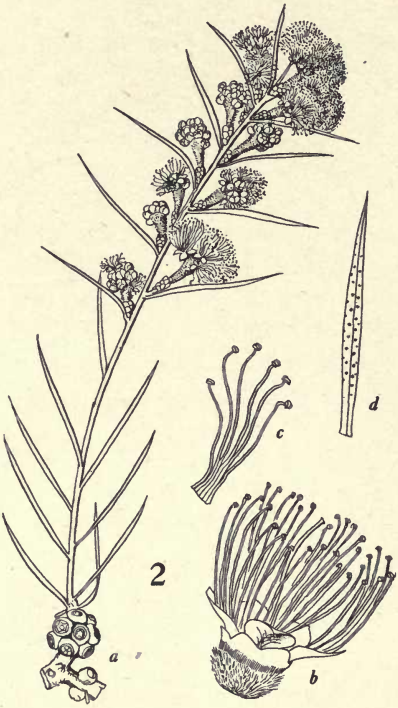

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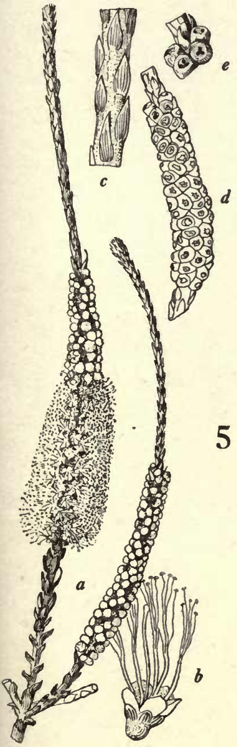

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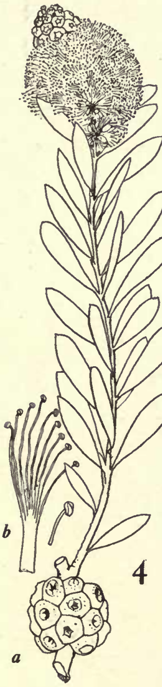

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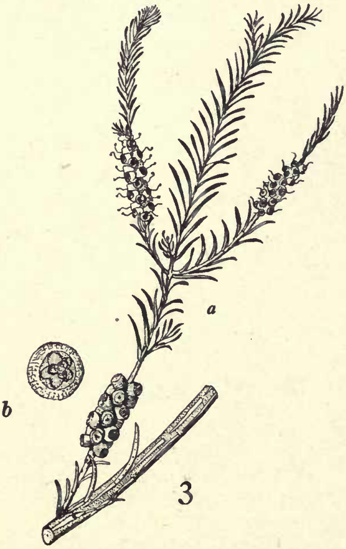

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PLATE 6.

Melaleuca armillaris Sm.

A vigorous specimen seven feet high, only two years old, bearing many pendant clusters of white flowers. Grown in Santa Barbara, California.

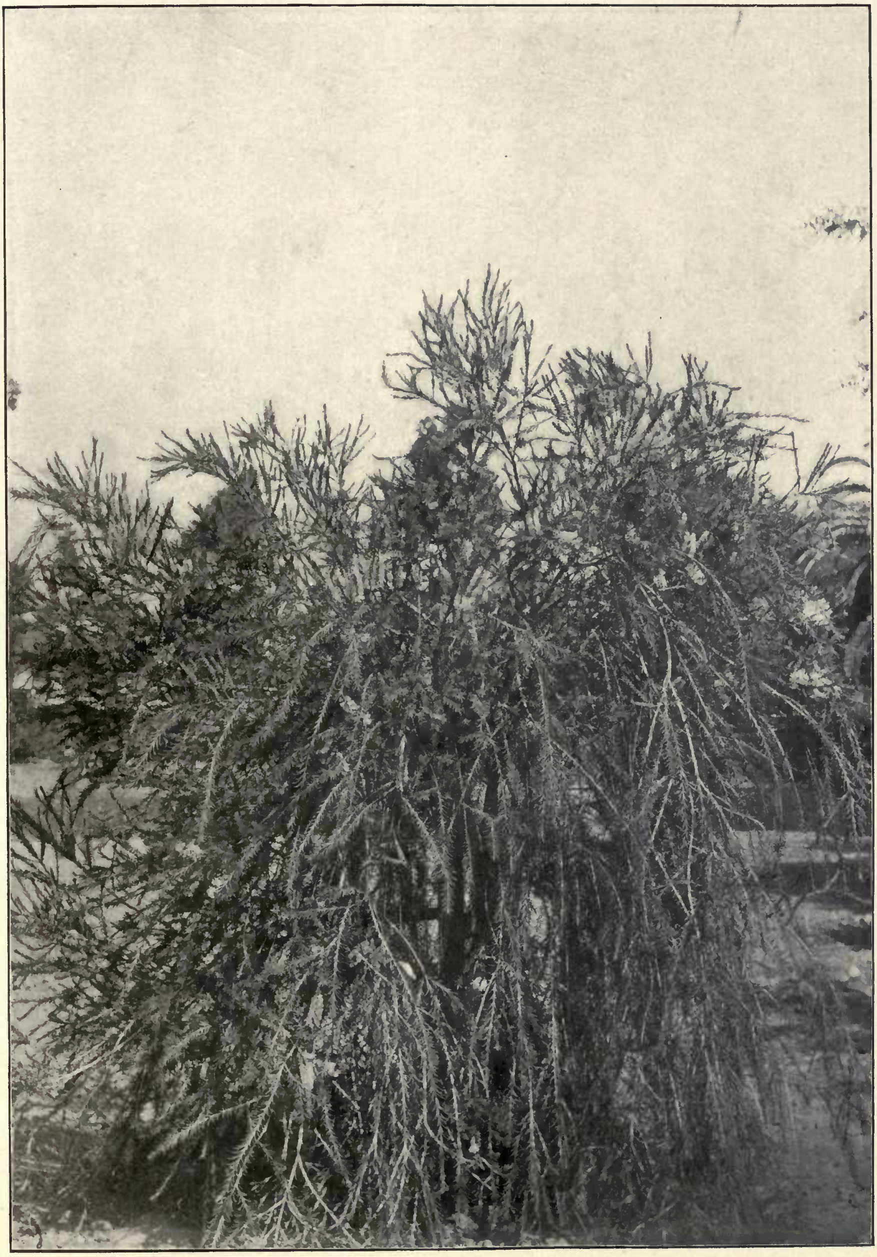


PLATE 7.

Lyonothamnus floribundus var. **asplenifolius** Brandegee. ISLAND IRONWOOD.

Forty-five feet high, trunk diameter ten inches, age fifteen years. Grown in the Botanic Gardens, Berkeley, California, from seed brought from Santa Cruz Island by Dr. Franceschi.

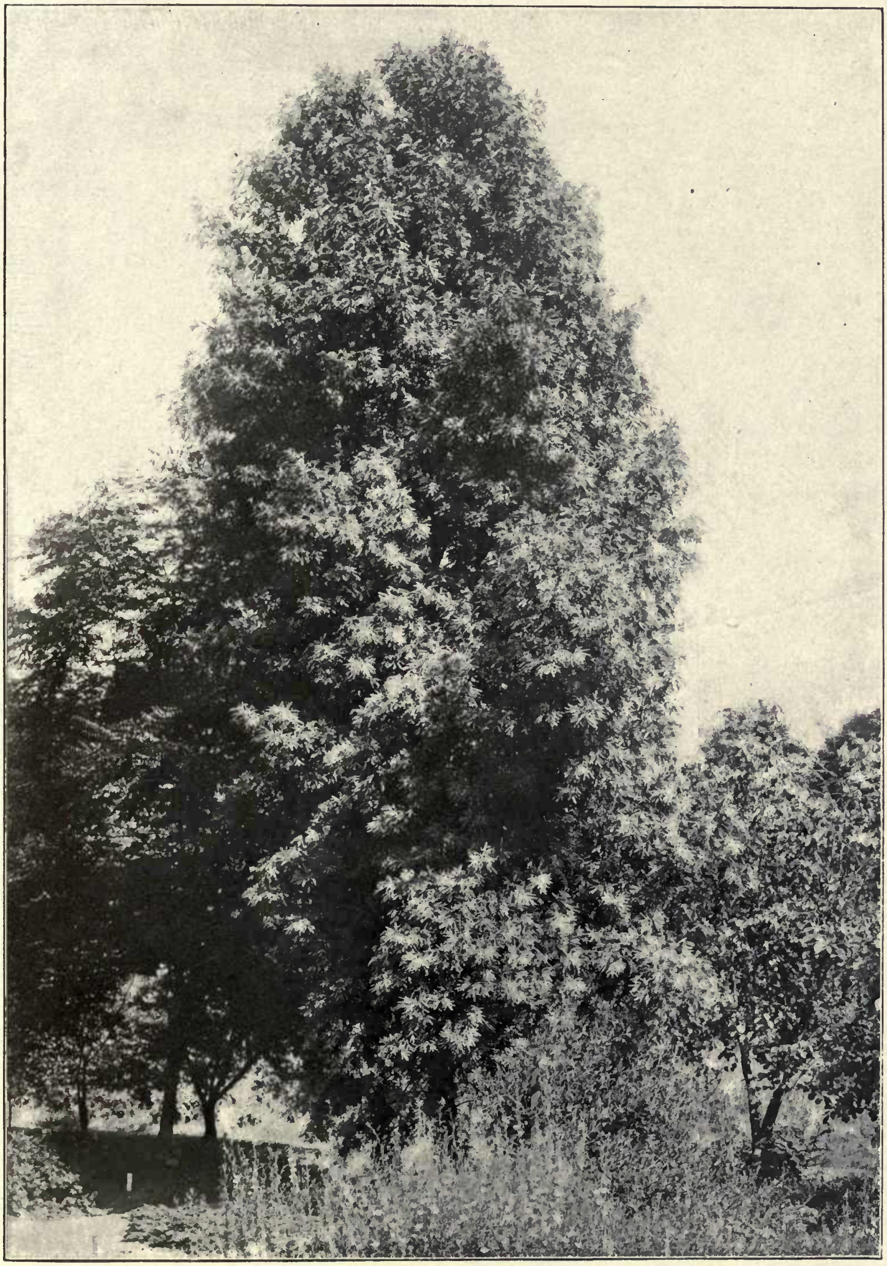


PLATE 8.

Eugenia myrtifolia Sims. AUSTRALIAN BRUSH CHERRY.

Thirty feet high, trunk diameter eight inches, age fourteen years. Grown in Berkeley, California, in clay soil. Foliage evergreen, smooth and shining, with a pink tinge when young, becoming green as it matures. Flowers white, not conspicuous, followed by pinkish-green berries.

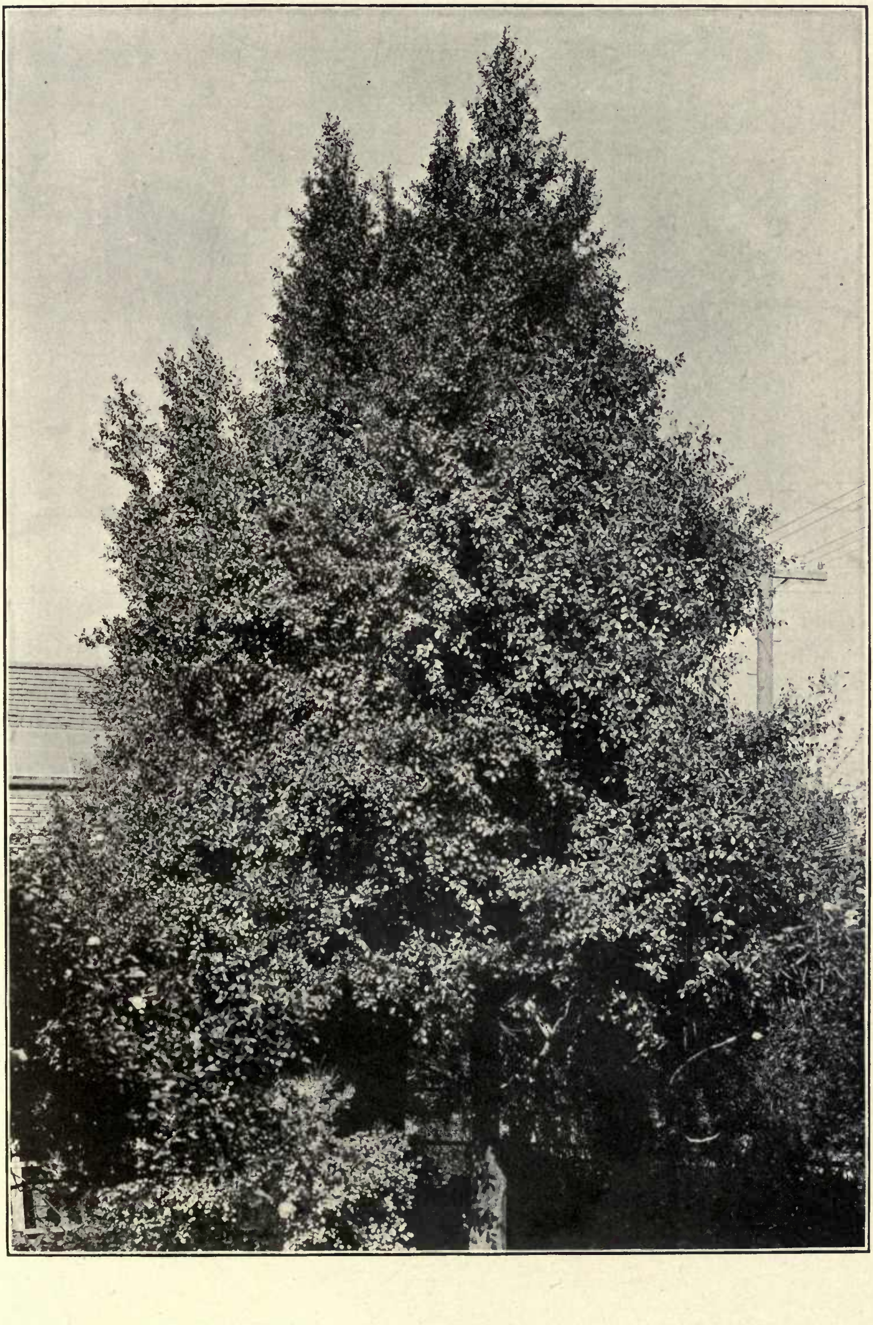


PLATE 9.

Maytenus Boaria Mol. MAYTEN.

A young tree of somewhat irregular growth. The pendant branches characteristic. Flowers inconspicuous. Grown in the Botanic Gardens, Berkeley, California. Valuable as a lawn tree and for avenue planting where an evergreen is desired.

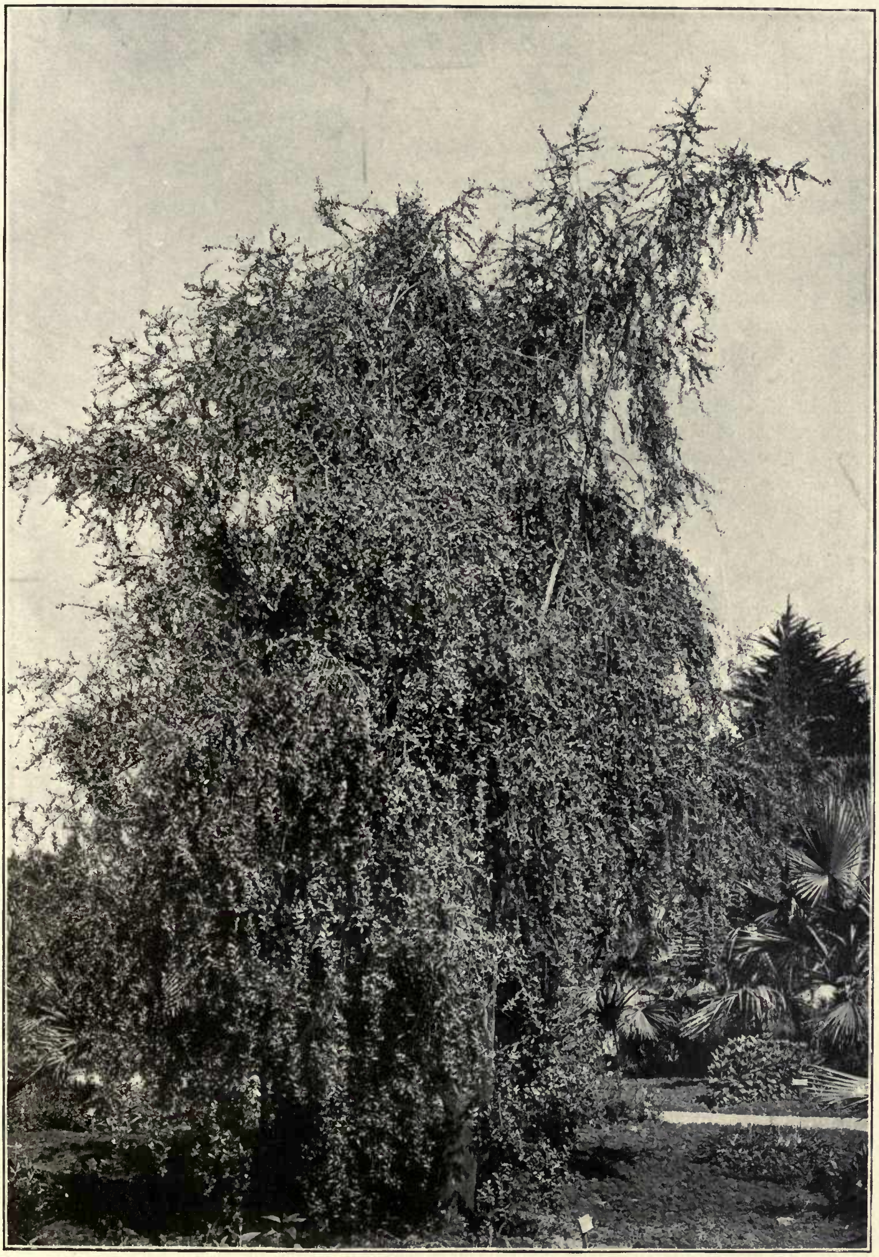


PLATE 10.

Choisya ternata HBK. Choisya.

A typical plant, grown on the grounds of Hotel del Monte, California. Height five feet. Flowers white, occurring throughout most of the year, the photograph taken in April. Leaves ternately compound, green, smooth, and glossy.

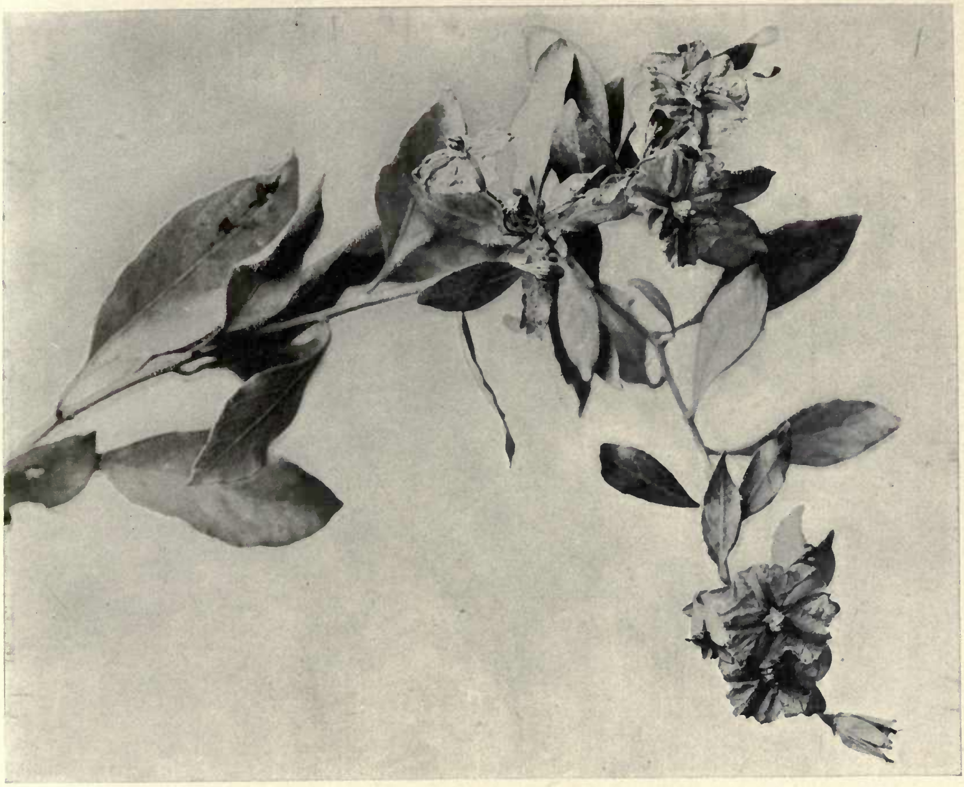
PLATE 11.

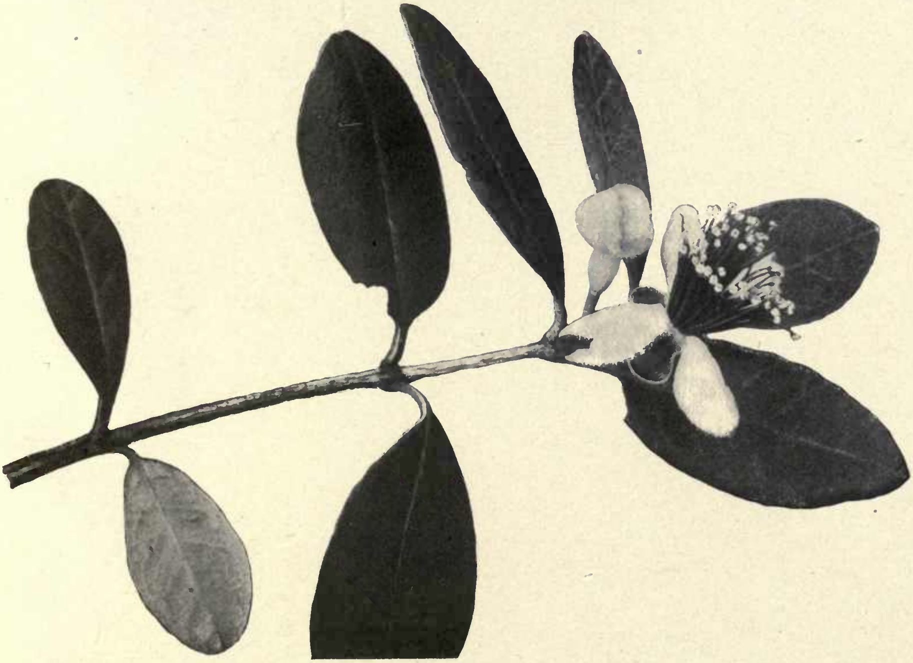
1. **Solanum Rantonnetii** Carr. BLUE-FLOWERED SOLANUM.

Branch taken from a vine twelve feet high, grown at Santa Barbara, California. Often trained as a flowering shrub and usually more floriferous than shown in this illustration. Flowers violet-blue.

2. **Feijoa Sellowiana** Berg. FEIJOA.

Flowering branch from a plant grown at Pasadena, California. Petals red, the inrolled margins white. Leaves green above, white-silky beneath. The plant is a tall shrub, grown as an ornamental and also for its perfumed fruits.





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